Programme of activities design document form

(Version 08.1)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the PoA	Clean Cook Stoves in Sub-Saharan Africa by ClimateCare Limited
Version number of the PoA-DD	07
Completion date of the PoA-DD	23/03/2018
Coordinating/managing entity	ClimateCare Limited
Host Parties	Ghana, Kenya
Applied methodologies and standardized baselines	AMS-II.G. ver. 04 - Energy efficiency measures in thermal applications of non-renewable biomass
Sectoral scopes linked to the applied methodologies	3: Energy demand

PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of PoA

>>

This SSC-PoA has the goal of introducing wide-scale adoption of efficient charcoal cooking to kitchens in Ghana and Kenya, and later, in Sub-Saharan Africa through the design or adoption of a design, manufacture, distribution, sale and after-sale support of efficient charcoal stoves over the next 28 years. This will constitute a market transformation, reducing global greenhouse gas emissions, reducing pressure on forests and woody biomass resources. Initially, the PoA will cover Ghana and Kenya, with the possibility of gradually spreading to other countries of Sub-Saharan African.

Each CPA within the PoA will develop/adopt cooks stove designs, which address the product-specific factors such as safety, indoor smoke, usage cost and stove prices, which have been largely disregarded but are significant, in determining the uptake of improved cook stoves at the house hold level together with a, significant public education component. Raising awareness through information provided with products, as well as targeted media campaigns will further promote the benefits of efficient or improved charcoal stoves (ECS) in Ghana, Kenya and Sub-Saharan Africa. The messaging will promote behavioural change, encourage further energy savings while reducing deforestation and indoor air pollution.

2. General operation and implementing framework of PoA

The predominant cooking fuel for families in urban areas of Ghana and Kenya (in particular) and Sub-Saharan Africa (in general) is charcoal[1] made from predominantly non-renewable wood using inefficient production and usage methods[2]. The green-house gas emissions associated with the production and combustion of the charcoal is significant, in areas where the wood source is non-renewing, which is commonly the case in Sub-Saharan Africa[3]. This is not only the existing scenario but also the energy baseline scenario[4].

The purpose of this Programme of Activities (PoA) is to reduce the greenhouse gas emissions from this source, by promoting the design, manufacture, distribution and use of efficient or improved charcoal stoves (ECS) which provide the same service with significantly less fuel than traditional charcoal stoves in common use. The adoption and usage of the improved cook-stoves by Ghana, and later Sub-Saharan African, users therefore constitutes the project scenario.

The Programme promotes the design or adoption of a design, manufacture, promotion and awareness creation, distribution and use of various types of efficient charcoal stoves developed to match market interest in Ghana and Kenya, with the possibility of expanding into geographically distinct areas across the Sub-Saharan region. The principal design features a pot-skirt and a conical grate or some other technologically equivalent design feature that improves charcoal stoves efficiency and market acceptance. Market trials have shown that this design is popular. Pilot trials and field tests have shown fuel savings between 30% and 50% compared to the baseline traditional charcoal stove, with commensurate cash expenditure savings by low-income families.

---

[1] Cooking accounts for substantial use of energy: wood or charcoal provides about 80% of the energy consumed in Sub-Saharan Africa (http://www.sustainergyweb.eu/practicialinfo/issue-improved-cookstoves-advantages-and-challenges-spread-improved-cook-stoves/)

[2] http://www.compete-bioafrica.net/improved_land/Annex2-2-2-COMPETE-032448-2ndReport-D2-2-D2-3-Final-Final.pdf

[3] http://www.sei-international.org/mediamanager/documents/Projects/Climate/household_energy_pb_090603_fxj.pdf

[4] http://www.sustainergyweb.eu/practicialinfo/designing-improved-domestic-cookstove-charcoal-basis-sub-saharan-africa/

Each small scale CDM programme activity (SSC-CPA) will be implemented in Ghana and Kenya, with the possibility of expanding into geographically distinct areas across the Sub-Saharan region. The CPA is further limited by the small scale threshold of AMS II.G (vers. 04.0), i.e. the maximum energy savings of the sum of all ECSs implemented under a specific CPA shall not exceed thermal energy savings of 180 GWh/year (threshold as per clarification request SSC_233; http://cdm.unfccc.int/methodologies/DB/6U8JYO9XTLVZ8LJ7GUBSZP145BIDG2).

Once the maximum number of appliances under the threshold is reached (or before, as deemed appropriate) (see Section K), the CPA shall be closed, and depending on the circumstances, a new CPA may be started to accommodate any new stoves sold.

During the life of the SSC-PoA, the number of CPAs implemented will increase and be monitored according to the monitoring plan as described below. Different CPAs may be installed in the same areas, but can always be distinguished by a sales record keeping system with a unique serial number for every ECS sold, which will ensure that each ECS can be traced to one specific CPA to avoid double counting

The PoA and each CPA will be implemented and managed by the Coordinating/Managing Entity (CME), in collaboration with Programme Activity Implementers (PAIs).

The CME for the PoA is ClimateCare Limited (ClimateCare), who will act as the focal point for the Executive Board of the CDM in all aspects relating to validation, verification, registration and issuance of carbon credits generated by the programme. Based on previous CDM experience and staff training, the CME and the assigned staff have the competencies to check the features of potential CPAs and ensure that each CPA meets the eligibility criteria before inclusion in the registered PoA.

The CME will verify the Sales Database and prepare monitoring reports. The CME will facilitate the validation and verification processes while advising the PAI on the carbon asset development activities.

Implementation of the CPAs is the responsibility of the PAIs. These each prepare and manage a single CDM programme activity (CPA). PAIs will sell ECSs on a commercial basis through appropriate agents developed by the PAIs themselves. Each PAI will be responsible for the manufacture or sourcing, awareness creation[5], marketing and distribution of stoves for their respective CPAs. The PAIs will also be responsible for collecting and storing stoves Sales Database and maintaining the Sales Database (as described below) while providing the after sales service to the users. Each PAI will act individually, running the project in accordance with the demand of the local market.

Procedures to assert legal rights of the carbon credits generated and to avoid double counting have been set up for the PoA and appropriate records and documentation control process, for each CPA under the PoA, have been set up as described in Section B.

Accordingly, the PAIs will use the CER proceeds to reduce costs of ECS to users, provide maintenance and to recoup associated costs for the dissemination of stoves, such as training of supply chain personnel, marketing activities and building new manufacturing units.

Measures for continual improvements of the PoA management have been established and are implemented with each CPA.

The project activity contributes to sustainable development in the following ways:

[5] The UN and Hedon identify awareness creation as a key factor in stove acceptance and use; http://www.hedon.info/article2617

Environmental benefits:

- *Air quality:* Children and mothers will be exposed to fewer air pollutants through reduced emission of not only CO2, but also carbon monoxide and particulate matter. Air pollution from cooking with solid fuel is a key risk factor for childhood pneumonia as well as many other respiratory diseases and cancer[6].
- *Biodiversity:* will be improved as the programme reduces pressure on remaining forest reserves in countries covered by the PoA.

Social and Economic benefits:

- *Employment:* the programme will create employment opportunities for new supply chain and office staff and other related jobs in the participating countries.
- *Livelihood of the poor:* the circumstances of poor families will be improved since the stoves reduce fuel cost. Reduction in wood consumption implies relief from drudgery and more opportunity for productive activity, arising from less time spent collecting fuel[7].
- *Access to energy services:* The ECSs require less fuel, which in many areas, is a scarce resource or very expensive to buy. Users have also found ECSs more convenient, shortening the cooking time.
- *Human and institutional capacity:* is raised through business development component of the project. The programme as part of its large-scale promotion and advertising will facilitate capacity development among the employed staff through trainings and workshops in the Ghana, and later, in Sub-Saharan Africa.
- *Technological self-reliance:* the introduction of a locally manufactured technology with optimized energy efficiency helps to build technological self-reliance.

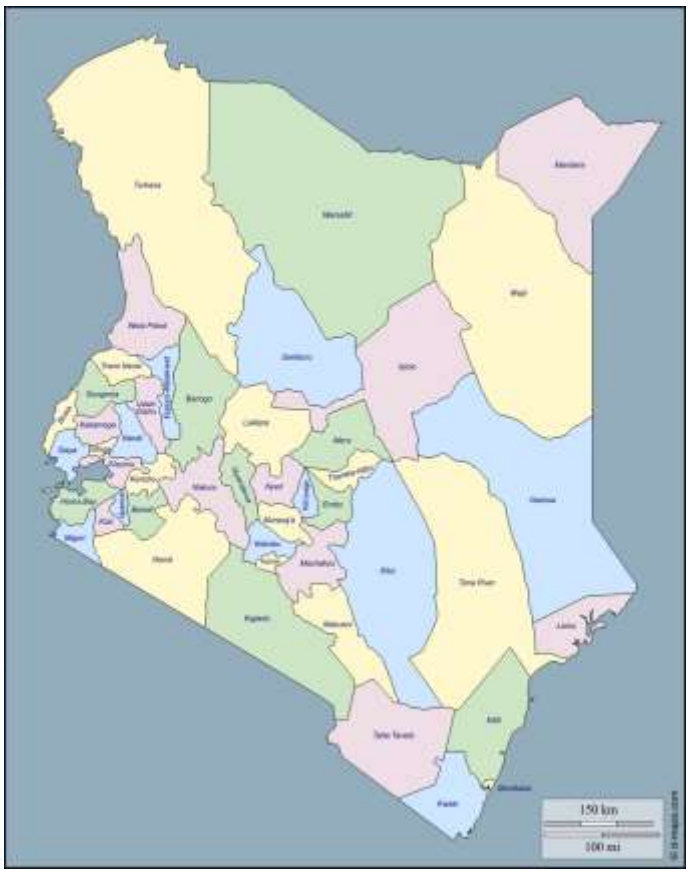
A.2. Physical/geographical boundary of PoA

>>

The PoA covers the geographical boundary of the country of Ghana and has been expanded to include the geographical boundary of Kenya. In future, the geographical boundary of the PoA will be amended to include other Sub-Saharan Countries as necessary.

Figure 1: Map of Ghana & Kenya: The physical boundary of the PoA

[6] World Health Organization, 2005 - http://www.who.int/mediacentre/factsheets/fs292/en/index.html
[7] http://www.lifelinefund.org/why-stoves.php



A.3. Technologies/measures

>>

The Programme promotes wide-spread manufacture and use of various types of efficient charcoal stoves developed to match market interest in various regions of Sub-Saharan Africa. The main stove design is an adaptation of the Pulamusa[8] stove developed by ProBEC in Zambia after extensive research into the manufacturing of energy efficient stoves and other thermal technologies. The principal stove design features a pot-skirt and a conical grate or some other technologically equivalent design feature that improves the efficiency of charcoal stoves and their demand, depending on the locally available skills and resources. The stoves will be constructed by local trained technicians working mostly in centralised manufacturing workshops operated and managed by the PAIs. The main focus of the PoA will be the design or adoption of an appropriate design, manufacture, promotion and awareness creation, distribution and sale of the ECSs. The stoves are made of Galvanised/Mild Steel Plate and can be produced by a PAI in a range of sizes depending on the needs of the target users.

The ECSs are more efficient than traditional charcoal stoves as they reduce the heat loss and market trials have shown that the Pulamusa design is popular. Pilot trials and field tests have shown significant fuel savings compared to the baseline traditional charcoal stove, with commensurate cash expenditure savings by low-income families. Water boiling tests carried out on the project domestic model envisioned for the first SSC-CPA has shown that it has a thermal efficiency higher than 40%[9].

[8] http://www.probec.org/displaysection.php?czacc=&zSelectedSectionID=sec1192753796&zSelectedAssetID=ast1217834847

[9] See Water Boiling Test Results for CookMate carried out by the Institute of Industrial Research (IIR) of the Council for Scientific and Industrial Research (CSIR), Ghana.

During the life of the project, research and development work may result in more efficient ECS designs, which shall be absorbed by this PoA, subject to the appropriate tests proving real and measurable quantity of charcoal saved.

The PAIs are encouraged to invest in research and development for the improvement of the current ECS being disseminated. It is also encouraged that know-how as to the design and construction of improved stoves proven in other countries be transferred to Ghana and the Sub-Saharan Region as part of the CPAs. This technology transfer could be from other countries which have developed affordable technologies suitable for the PoA covered region and markets

The detailed description of the specific ECS design and the main manufacturing and/or production technologies, systems and equipment involved will be defined at the CPA level.

A.4. Coordinating/managing entity

>>

The CME for the PoA is ClimateCare Limited (ClimateCare). As the CME, ClimateCare Limited will act as the Focal Point for all Scopes of Authority and is therefore the entity that communicates with the Executive Board of the CDM in all aspects relating to validation, verification, registration and issuance of carbon credits generated by the programme.

As per paragraph 137 of the Project Standard, “the operators of individual CPAs are not required to be project participants”. As such, PAIs are not required to be project participants and CDM programme participation is only recorded at the PoA level. The inclusions of new CPAs to the PoA will be requested by the CME to the DOE during the lifetime of the PoA.

Multiple CPAs can operate within the same geographic location as the monitoring plan will ensure that there is no double counting of installed systems

Each CPA will operate nominally within a specific country or geographic area, while geographically overlapping PAI activity is also expected to occur.

1. ClimateCare limited is the CME of the PoA and also the project participants for the CPA03.
2. CookClean Ghana Limited is the project participants for the CPA 01 and CPA02

A.5. Parties and project participants

Name of Party involved (host) indicates host Party	Private and/or public entity(ies) project participants, CME (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ghana (host)	ClimateCare Limited (CME) (Private)	No
Sweden	Swedish Energy Agency (Private)	No
Kenya (host)	ClimateCare Limited (CME) (Private)	No

ClimateCare (CME) is the entity that will be communicating with the Board on all matter relating to the PoA.

A.6. Public funding of PoA

>>

The PoA has not and will not receive public funding from Parties included in Annex I. Any CPA that receives public funding from Annex 1 parties will confirm that it does not result in diversion of official development assistance.

SECTION B. Management system

>>

According to the *"Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities"* (EB 65 Annex 3), the management systems should include the following aspects:

a) A definition of the roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies
b) Records of arrangements for training and capacity development of personnel
c) Procedures for technical review of inclusion of CPAs
d) A procedure to avoid double counting
e) Records and documentation control process for each CPA under the PoA
f) Measures for continuous improvements of the PoA Management system
g) Any other relevant elements

Roles and responsibilities

The programme is managed by ClimateCare Limited as the Co-ordinating/Managing Entity (CME), and it is implemented by Programme Activity Implementers (PAIs) through small scale CDM programme activities (CPAs), which will be implemented in Ghana, with the possibility of expansion into geographically distinct areas across the Sub-Saharan African region (see Operational Diagram below).

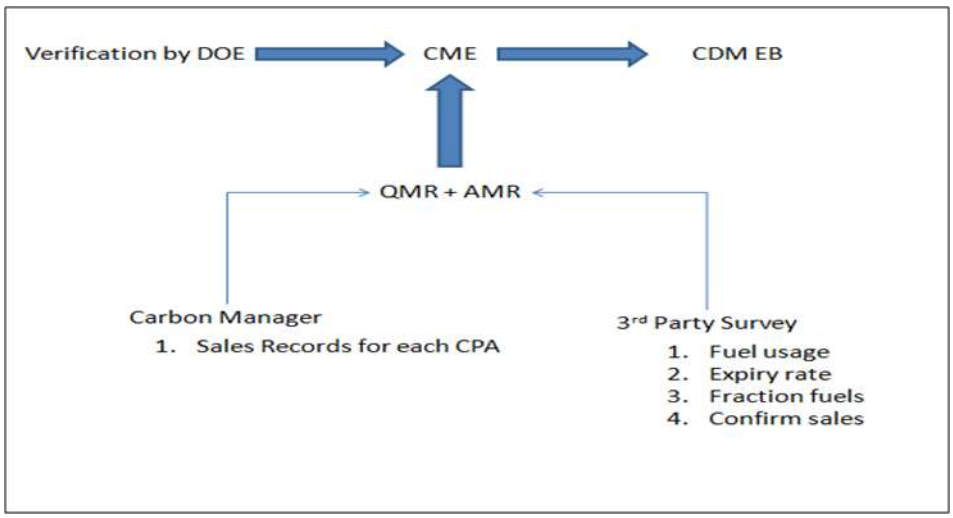
ClimateCare Limited (ClimateCare), as the CME for the PoA, will act as the focal point for the Executive Board of the CDM in all aspects relating to validation, verification, registration and issuance of carbon credits generated by the programme. Based on previous CDM experience and staff training, the CME and the assigned staff have the competencies to check the features of potential CPAs and ensure that each CPA meets the eligibility criteria before inclusion and listing in the registered PoA as per Section K.

The CME will provide oversight of the record-keeping by all parties involved in CPAs, verifying the Sales Database of the individual CPAs, maintaining the global PoA level Sales Database and preparing the monitoring reports. The CME will facilitate the validation and verification processes while advising the PAI on the carbon asset development activities and supporting training and capacity development of CPA personnel.

Implementation of the CPAs is the responsibility of the PAIs. These each prepare and run a single CDM programme activity (CPA). PAIs will sell ECSs on a commercial basis through appropriate agents developed by the PAIs themselves, provide technical support, guidelines, and secure wholesale contracts for local retailers of ECSs. Each PAI is responsible for the design or design adaptation, manufacture, marketing, distribution and after sale service of the ECSs, while also creating awareness[10] and providing instructions on usage. The PAIs will maintain records of arrangements for training and capacity development of CPA personnel. The PAIs will also be responsible for collecting and storing stoves Sales Database and maintaining the Sales Database (as described below) for their respective CPAs. Each PAI will act individually, running the project in accordance with the demand of the local market.

Operational Diagram

[10] The UN and Hedon identify awareness creation as a key factor in stove acceptance and use; http://www.hedon.info/article2617



Training and capacity development records

The PAI is responsible for ensuring that the Sales Contract and Invoice are correct and complete. Training will be given to all PAIs on the management system to be put in place as part of the PoA. Training will include:

i.) Details of the data to be recorded in the database
ii.) Sales contracting and/or invoicing processes (including how to ensure unique identification of each efficient stove through the serial numbers and how to record the other required details, procedures to ensure participation households/customers transfer their title to the CERs to the CME etc.)
iii.) Details of where to send copies of the project documentation
iv.) Monitoring procedures
v.) Procedures for dealing with a change in serial number, address of the improved cook stoves.

On completion of training the PAI will be issued with a letter or certificate confirming their attendance, including the name, company and contact details of all attendees, date of attendance and CPA number. All information will be provided to the DOE upon request. This will be used to confirm that training has been completed.

Procedures for technical review and inclusion of CPAs

The CME shall ensure that all CPAs included under the PoA meet the eligibility criteria outlined in section K of the PoA-DD and that the records of the technical review process are maintained. The technical review process for each CPA shall ensure that the criteria outlined in Section K are met by the CPA. All documentation will be kept in an organised and easy to access manner, such as sorting by either date or serial number with a clear division between the CPAs.

The PoA Joining Agreement signed between ClimateCare Limited and each PAI for each CPA ensures that the PAI is aware of and has agreed that their activity is being subscribed to the PoA. The contract also ensures that the PAI is aware and agrees to abide by the inclusion criteria specified in Section K.

Procedures to assert legal rights for the carbon credits and avoid double counting

Procedures to assert legal rights of the carbon credits generated and to avoid double counting have been set up for the PoA and appropriate records and documentation control process, for each CPA under the PoA, have been set up as described in this section below.

The manufacturing and distribution process will be supported by an awareness campaign to ensure households are aware of the project activity and the stove benefits, and that adoption of the stoves is accelerated in the geographic area of operation of the CPA and PoA. The method of manufacture and distribution, together with the associated awareness-raising campaigns will focus on providing the urban charcoal-using households although it is realised that some of the stoves will find their way into the rural areas.

The operation of the ECS is carried out by the user, and training on how to use and maintain the ECS is given by the PAI. The PAIs will follow the monitoring plan and procedures for identifying each stove sold as part of the programme and those which are still in use, so the appropriate emission reductions are claimed. To facilitate this process, the PAIs will assign a serial number to each ECS during its manufacture and record this number in the Sales Database, which will be maintained by the PAI. The PAIs are also responsible for collecting the Warranty Cards from the retailers and/or users.

Before the sale of the ECS, the user shall be informed that CDM finance is being used to fund the ECS, and the user shall agree to transfer the rights to the emission reductions to the PAI, and to cooperate with the PAI and the CME (ClimateCare Limited) for monitoring purposes as per the Warranty Card.

The Warranty Card will also contain the following information:

- Name of customer
- Address and phone number
- Stove model and serial number
- Sale date

The information collected by the PAI is transferred to an electronic database (the Sales Database) which is updated regularly and shared with the CME. The Sales Database carries all the sales information listed above including the actual sale date. The Sales Database is a key component of the annual monitoring report, since the actual sale date is used to calculate the emission reductions achieved by the sold ECSs.

Each CPA keeps a Sales Database, which will keep information on all ECS deployed, to determine N_y (See Part II, Section I.7.1 below). At least the following information will be recorded and updated continuously:

- ECSs sold with their serial numbers
- User details (Name, Location, address and telephone number, if available)
- Sales date
- CPA-ID to which the appliance belongs

All PAI records are reviewed by the CME together with cross-checks on the PAIs' Sales Database in order to confirm that the Sales Database is authentic and that no double-counting occurs. The CME will then use the sales data from the PAIs to update the global PoA sales database and to ensure no double counting, both of CPAs and ECSs.

Double counting is avoided by recording the serial number of each efficient stove installed and by registering these numbers in the global sales database together with the contact details of the user. The database will restrict entry of repeat serial numbers and/or contact details. The serial number together with the contact details of the user constitutes the unique identification of the system.

Accordingly, the PAIs will use the CER proceeds to reduce costs of ECS to users, provide maintenance and to recoup associated costs for the dissemination of stoves, such as training of supply chain personnel, marketing activities and building new manufacturing units.

Records and documentation control process for each CPA under the PoA

The database provides the basis for the emission reduction calculations. The database should therefore be complete and accurate. Any incomplete, inaccurate or false information in the database puts the carbon credits from the project at risk.

The CME will establish and maintain an extensive database for each and every CPA wherein the following data will be recorded:

i. Name of the CPA
ii. Name of the implementing entity of the CPA (PAI)
iii. Contact details of the implementing entity including contact person, address, telephone and email address
iv. Types of stove (ECS)
v. Installed capacity and other relevant technical specifications of each CPA
vi. Location of the CPA (GPS coordinates of the factory and registered office)
vii. Verification status and monitoring reports of the CPA

All the above parameters will be provided by each CPA implementing entity at the time of registration. The CPA will record the data in its data collection system which is made available to the CME.

Each PAI will maintain a unique Sales Database, and maintain up-to-date and clear manufacturing, shipping, and stock records. ClimateCare Limited will also provide guidance on record keeping while providing quality control through supervision and spots checks. It will be possible therefore for a verifier to confirm the accuracy of the Sales Database, and to confirm that no ECSs have been double-counted. ClimateCare will ensure that no PAI is conducting a similar activity as a stand-alone CDM project activity or as another CPA within another PoA.

The CME will prepare quarterly and annual reports summarising CPA Sales Data and correlating the data against manufacturing and shipping records, together with results of annual monitoring surveys. These reports are marked as QMR and AMR on the Operational Diagram above.

The CME will support the process of data collection by analysis of quarterly reports and co-operation with regard to preparation of annual reports for submission to the verifying DOE.

The CME will also be responsible for the commissioning of annual monitoring surveys by a credible 3rd party consultant as indicated in the Operational Diagram above.

Each improved cooking stove will start to generate emission reductions in the month following the sales date (or the date of CPA inclusion, whichever is later), to account for delays between sales and first use.

Data will be kept for the whole crediting period of the CPA and an additional two years.

Measures for continuous improvements of the PoA management system.

Measures for continual improvements of the PoA management have been established and are implemented with each CPA.

CME, close consultation with the PAIs, shall continually improve the effectiveness of the PoA management system through the use of the quality policy, quality objectives, audit results, data analysis, corrective and preventive actions with an appropriate management review system. If the methodology and standard are updated, the PoA management system will be improved too.

Check on debundling

In accordance with paragraph 10 of Annex 13; EB54, the de-bundling provisions do not apply as the energy saved by each ECS is less than 1% of the limit set for the CPAs of small-scale PoAs and the CPA is considered as not being a de-bundled component of a large activity.

SECTION C. Demonstration of additionality of PoA

>>

The most common cooking fuel in urban Ghana and other Sub-Saharan African Countries is charcoal made from wood using inefficient production methods[11]. In the absence of new policies, the number of people relying on biomass is expected to continue to increase. There is evidence that, in areas where local prices have adjusted to recent high international energy prices, the shift to cleaner, more efficient use of energy for cooking has actually slowed and even reversed[12].

The green-house gas emissions associated with the production of the charcoal and its combustion in the traditional inefficient charcoal stoves is significant, in areas where the wood source is non-renewing, as is commonly the case in Ghana and other Sub-Saharan Africa.

The prevailing cook-stove technology in urban Ghana and Sub-Saharan African Countries is a form of traditional inefficient charcoal stove. Most of the urban households in Ghana and other Sub-Saharan African Countries purchase charcoal to cook their meals, using the inefficient traditional stoves. The substitution of traditional stoves with efficient charcoal stoves (ECSs) saves up to 50% of the charcoal compared to the traditional charcoal stoves[13]. By reducing non-renewable charcoal consumption, the PoA is reducing anthropogenic GHG emissions.

In this section and as explained in Section B.1 of the *"Guidelines for completing the programme design document form for small-scale CDM programmes of activities"*; (EB67, Annex 30), the project developer should *"describe how in the absence of CDM, none of the implemented CPAs would occur"*.

The following is a description of how in the absence of CDM, none of the implemented CPAs would occur. Similar analysis will be carried out at the CPA level to demonstrate how each CPA meet the additionality criteria. The description below also puts into consideration the guidelines provided in *the "Standard for the demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities"*, Version 01.0 (EB 65, Annex 3), the *"Guidelines on the demonstration of additionality of small-scale project activities*", Version 09.0 (EB 68, Annex 27), and the *"General guidelines for SSC methodologies"*; Version 19.0 (EB69, Annex 27).

In the absence of CDM, none of the implemented CPAs would occur

There has not been any previous announcement that the proposed voluntary coordinated action would be implemented in the absence of the PoA. The proposed activity could not be implemented in the absence of the PoA due to the presence of the barriers described below. At the same time the baseline situation, the continued use of non-renewable-wood charcoal for cooking at current levels of consumption in the baseline unimproved stoves, which is the prevailing practice, is not prevented by the same barriers.

[11] http://www.iea.org/WEO/database_electricity/WEO2006-Chapter%2015.pdf
[12] Energy for Cooking in Developing Countries; http://www.iea.org/WEO/database_electricity/WEO2006-Chapter%2015.pdf
[13] See the Excel spreadsheet calculation of Emission Reductions for CPA01; CookClean Stoves Project in Ghana.

Many efforts are being made towards the promotion of improved cookstoves, and especially the increasing use of charcoal, but their global impact so far has remained modest[14]. According to the International Energy Agency[15], vigorous and concerted government action is needed to achieve wide-spread adoption of improved stoves, together with increased funding from both public and private sources. Policies to promote cleaner, more efficient fuels and technologies for cooking need to address barriers to access, affordability and supply, and to form a central component of broader development strategies.

As per the *"Guidelines on the demonstration of additionality of small-scale project activities"*, Version 09.0 (EB 68, Annex 27), and with reference to the "Guidelines for objective demonstration and assessment of barriers; version 01"; EB 50, Annex 13, it is demonstrated below that in the absence of CDM, none of the implemented CPAs would occur due to the following barriers:

-
- Barrier due to lack of access to capital
- Technological barrier
- Barrier due to prevailing practice

Barrier due to limited access to capital (at PoA level)

An improved cookstove Programme of Activities, such as the proposed one, entails significant investment to meet the costs of design[16], field testing of stoves[17], promotion and distribution of the ECS. Donor aid is generally found to be the only way ECSs distribution is financed. Considerable finance is needed for marketing and awareness-raising, as potential customers for ECSs are used to paying very little for simple stoves and unwilling to pay more for an efficient stove, despite the short pay-back periods entailed by the saving of fuel. The programme therefore demands high expenditure on intensive marketing and distribution on a door-to-door basis by sales agents and also through various electronic media.

Also projects that aimed to create a semi-industrial line of production of improved cookstoves from scratch, certifying every unit for performance before it is put up for sale, had very limited impact during their lifetime and saw their effects disappear after the conclusion of the project[18]. The use of semi-industrial equipment (folding machines, drilling machines, welding sets) requires the use of new sheet metal of high quality and the recruitment of trained employees. This means a higher level of production costs, and puts improved cookstoves on the market at prices that are not competitive with those of traditional stoves [19] In addition, promotional campaigns with stove branding and improved presentation which are required to personalise these improved cook stoves and achieve market penetration increase the stove costs beyond reach of most of the target customers.

Some form of indirect/direct subsidy is required to enable stoves to reach households without the addition of supply chain margins and programme management overheads. There is no provision

[14] http://www.sustainergyweb.eu/practicialinfo/issue-improved-cookstoves-advantages-and-challenges-spread-improved-cook-stoves/

[15] Energy for Cooking in Developing Countries; http://www.iea.org/WEO/database_electricity/WEO2006-Chapter%2015.pdf

[16] For successful manufacture and distribution, a number of complex design issues have to be addressed (http://www.sustainergyweb.eu/practicialinfo/designing-improved-domestic-cookstove-charcoal-basis-sub-saharan-africa/)

[17] Field testing of cookstoves is costly and time consuming, but necessary; http://www.differgroup.com/Portals/53/Analysis/Cookstoves_Part1_Final.pdf

[18] http://www.sustainergyweb.eu/practicialinfo/issue-improved-cookstoves-advantages-and-challenges-spread-improved-cook-stoves/

[19] http://www.sustainergyweb.eu/practicialinfo/issue-improved-cookstoves-advantages-and-challenges-spread-improved-cook-stoves/

for such a subsidy or investment in Ghana or any other Sub-Saharan African countries that could be covered by the PoA. Carbon finance is crucial to overcoming this barrier.

The Coordinating/Managing Entity for the programme, ClimateCare Limited, although a well-established name in the carbon reduction business since 1997, has undergone major ownership changes following a management buy-out from JP Morgan[20]. As a new independent young company, ClimateCare Limited is not in a position to fund a programme of the proposed scale. The company, through this PoA, plans to enter into agreements with different project funders[21] to fund the PoA and the CPA under the PoA in exchange for the carbon credits. The agreements, which will include advance funding for the initial CPA activities under the PoA, would not be possible without carbon credits[22]. Future project activities under the PoA will be facilitated by ClimateCare Limited applying carbon credit purchase arrangements to attract capital in the same manner[23]. The PAIs would typical be small locally owned start up organisations that will have not had a similar project elsewhere.

From above, it is clear that significant capital is required to invest in a programme which could match the achievements of this proposed SSC-PoA, including for import of technologies; developing the brand; widespread marketing; and establishing a distribution and retail network. There is no precedent for large-scale private or public sector involvement in ECS promotion and distribution in Ghana and other Sub-Saharan African countries without assistance from carbon finance. Prevailing lack of awareness of technologies and low willingness and ability to pay among consumers underlines the need for extensive awareness raising and marketing, and the difficulty of realising sufficient margins at retail to cover all costs. It is unlikely that extensive credit would be extended for this activity. Without the CPA developer committing significant capital to the CPAs in the PoA, with the aim of securing CDM revenue, the CPAs would not be developed.

At the household level, to motivate a woman to choose an improved cookstove when replacing her traditional stove, she needs to be convinced that the improved cookstove will reduce pollution and health risks, but also and especially, that she will save charcoal. For modest income urban families in urban Ghana and other Sub-Saharan African Countries, the costs of cooking fuels are comparable to their food budget. However, the projected long-term savings will unfortunately not be sufficient for motivating a family to buy an improved cookstove. They still need to be able to pay the full price for it up front. Even if the investment is returned very quickly by the reduced need for fuel, families frequently do not have the savings to make that kind of investment in the first place. The price of such a unit should therefore be very close to that of a traditional stove if a massive spread of improved cookstoves is to be achieved. ECS will only be able to reach widespread application if it is economical AND if its purchase is financially possible for a great number of people[24].

The stoves therefore face an access to capital barrier at the following two levels:

- Potential users who would like to buy, but cannot afford the stoves.

---

[20] http://www.climatecare.org/about/climatecare-history/

[21] See Term Sheet signed between ClimateCare Limited, Bunge Emissions Fund Limited (http://www.bunge.com/citizenship/emissions_group.html) and CookClean Ghana Limited, the first PAI under the programme; and the Investment Agreement between Biocarbon Group Pte Limited, ClimateCare Limited and CookClean Ghana Limited

[22] See Term Sheet signed between ClimateCare Limited, BioCarbon Pte Limited (http://www.bunge.com/citizenship/emissions_group.html) and CookClean Ghana Limited, the first PAI under the programme; and the Investment Agreement between Biocarbon Group Pte Limited, ClimateCare Limited and CookClean Ghana Limited

[23] Such arrangements are usually very complex with elaborate due diligence. For example, Bunge Emissions Fund Limited pulled out of the arrangements in November 2011 and it took another 6 months before a similar arrangement was finalised with BioCarbon Pte Limited.

[24] http://www.sustainergyweb.eu/practicialinfo/issue-improved-cookstoves-advantages-and-challenges-spread-improved-cook-stoves/

- Potential investors who would like to manufacture and distribute the stoves but do not find it commercially attractive enough to attract funding without carbon funds (See also section on "barrier due to prevailing practice" below.

The above barriers are not faced by the baseline scenario which is the manufacture and distribution of traditional charcoal stoves.

The alternative "Continuation of the current situation whereby no programme of activities or other alternatives are undertaken" does not require any significant investment, being the existing scenario, and is therefore not prevented by this investment/access to capital barrier.

As explained in this section, the prospects of the project generating CERs, besides the stove sales revenues, is what attracts potential financiers to fund the initial CPA activities[25]. Such financiers would normally not finance this kind of project without CDM. Carbon funds are therefore to be used to subsidise the cost of the ECSs.

Technological barrier (at PoA level)

The extra specialised design input[26] and manufacturing techniques required to raise efficiency and make the ECSs are very unlikely to be developed spontaneously in the Ghana and the rest of the Sub-Saharan African region. ClimateCare Limited and the typical PAI will not have the technical skills to design the stoves or adapt existing designs to local situations and would require external resources for the design activity. Although, some level of local skills to make certain types of efficient charcoal stoves exist in a number of Sub-Saharan Africa, including Ghana, the skills to design, manufacture and sell the efficient charcoal stoves in the scale proposed by the programme does not exist. Studies show that to accurately identify the target market for improved stoves and fuels, a range of factors influencing household choice must be considered and that it is not sufficient to focus only on socioeconomic determinants of stove and fuel choice such as income, age and gender. Product-specific attributes such as perceived safety and smokiness must be addressed in order to effectively design programmes and interventions[27]. The study report concludes that *"consumer choice analyses should be used by policy makers and stove programme designers to formulate strategies for identifying the markets for improved stoves and fuels, designing more effective programmes and for tailoring the products accordingly"*.

Each project activity under the PoA will therefore require significant skill training across the stove supply chain to identify an appropriate existing stove design, adapt it for the local situation and set up the appropriate production and distribution systems[28] with trained staff for each CPA.

Before massive distribution, it is further important to have a prototype tested in practical use by several families and to gather their comments and suggestions before finalizing the design of the model[29]. This requires financial inputs which the typical CPA in Ghana and other Sub-Saharan African Countries cannot usually access.

The alternative "Continuation of the current situation whereby no programme activity or other alternatives are undertaken" does not require any major resources towards stove design, adaptation and staff training across the supply chain, being the existing scenario. It is therefore not prevented by this barrier.

---

[25] See Term Sheets with Bunge Emissions Fund Limited and BioCarbon Pte Limited; and the Investment Agreement between Biocarbon Group Pte Limited, ClimateCare Limited and CookClean Ghana Limited.

[26] The design must be adaptable even if the inner workings of the stove are quite similar (http://www.hedon.info/article2617)

[27] http://www.sei-international.org/mediamanager/documents/Projects/Climate/household_energy_pb_090603_fxj.pdf

[28] Each CPA will develop a distribution system comprising of existing and new distribution and retail outlets supported by sales and after sales staff and vehicles.

[29] http://www.sustainergyweb.eu/practicialinfo/designing-improved-domestic-cookstove-charcoal-basis-sub-saharan-africa/

The carbon revenue will alleviate this barrier by helping to finance the design identification and adaptation activities and the necessary training and skills development as described above.

Barrier due to prevailing practice (at PoA level)

Despite the numerous benefits associated with cleaner alternatives, the transition to improved stoves has not progressed hugely in Ghana and other Sub-Saharan African Countries. So often, well designed, efficient and clean stoves fail to penetrate the market in developing countries due to a number of barriers[30]. A major barrier to large scale implementation of improved cook stoves programmes is the habitual use of the traditional inefficient stoves which imposes a very strong influence on the baseline scenario, resulting in continued use of traditional inefficient stoves[31]. In order to design effective policies and programmes to scale up the use of cleaner cooking stoves, the barriers to improved cooking stoves must be understood at the household level. Recent research findings have shown that there has been inadequate understanding why large adoption of improved stoves has been slow as the research on the determinants of stove choice at the household level has focused mainly on socio-economic factors, such as income, age, gender and education. The role of product-specific factors such as safety, indoor smoke, usage cost and stove price, which have been largely disregarded but are significant, are just beginning to be understood. This lack of understanding has been one of the major factors contributing to the slow adoption of improved cooks stoves[32].

In addition, the potential customers for ECSs are used to paying very little for simple stoves and unwilling to pay more for an efficient stove, despite the short pay-back periods entailed by the saving of expenditure on fuel. There is no one-size-fits-all solution, and cooking is one of the most unique cultural practices around the world. This means the design must be adaptable even if the inner workings of the stove are quite similar[33]. To design improved cook stoves that comply with the requirements of cooking traditional dishes, but also with the ability of local technicians to manufacture and widely disseminate them instead of traditional stoves, it is first necessary to know about the habits of the families and technicians and which constraints they have to deal with[34]. The massive dissemination of improved cook stoves has therefore to start with assessing the social settings followed by conceptualising and experimenting with the prototypes of cook stove. The proposed PoA therefore includes a large element of design adaptation, intensive awareness creation and efforts towards behavioural change with appropriate media marketing and distribution on a door-to-door basis by sales agents.

Based on the above mentioned study findings, the PoA has the objective of facilitating access to carbon finance by improved stove project developers. The funds are to be used for developing/adopting cooks stove designs and projects which address the product-specific factors such as safety, indoor smoke, usage cost and stove prices, which have been largely disregarded but are significant, in determining the uptake of improved cook stoves at the house hold level. A significant amount of sensitisation, marketing, demonstration or education is also required to overcome this prevailing practice. Carbon revenues will fund these activities to shift the common practice from inefficient traditional stoves to improved ones under the PoA.

Similar ECS programmes that have been implemented in African countries have relied on carbon finance. Examples of such projects are the “Improved Cooking Stoves for Nigeria Programme of Activities”

---

[30] http://issuu.com/deanford/docs/03739_eco_boiling_point_57?mode=window&pageNumber=8

[31] Why perfect stoves are not always chosen: A new approach for understanding stove and fuel choice at the household level (http://www.hedon.info/docs/BP57_LambeEtAl.pdf) , Understanding Low Demand: An Experimental Study of Cook-stove Adoption in Bangladesh, (http://faculty.som.yale.edu/mushfiqmobarak/Mobarak%20Stoves%20ASSA.pdf) and Intra-Household Externalities And Low Demand For A New Technology: Experimental Evidence On Improved Cookstoves (http://www.povertyactionlab.org/publication/intra-household-externalities-and-low-demand-new-technology-experimental-evidence-improved-cookstove)

[32] http://issuu.com/deanford/docs/03739_eco_boiling_point_57?mode=window&pageNumber=8

[33] http://www.hedon.info/article2617

[34] A programme of massive dissemination of improved cook stoves has to collect quantitative information that are statistically representative, and more qualitative information, and it has to take into account feedback from women who use the improved cook stove prototypes (http://www.sustainergyweb.eu/practicialinfo/massive-dissemination-improved-domestic-charcoal-cook-stoves/)

(http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7R1B09HSJV3FKIZYCA4D6XQOETP5GN/view) and "Improved Cook Stoves for East Africa (ICSEA)" (http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/8M4PPYQK5DXE7Q5W6G8UMAHX9TVF14/view.html), among others.

The alternative "Continuation of the current situation whereby no programme activity or other alternatives are undertaken" is the existing scenario and does not face any prevailing practice barriers.

The carbon revenue will alleviate this barrier by helping to finance the necessary design adaptation, branding and intensive awareness creation and efforts towards behavioural change, with appropriate media marketing and distribution on a door-to-door basis by sales agents.

The above analysis shows that the programme faces real and significant barriers. The registration of the programme under the CDM will provide a revenue source over and above ECS sales revenue, which will remain available through a great many years, so underpinning a large-scale market transformation. This will enable the PAIs to subsidise the stoves and make them more affordable by the target customers while at the same time making it more commercially viable and attractive to private investors. Without a long-term extra revenue source such as CDM funds, the programme could not achieve this goal and none of the CPAs would occur in the absence of the CDM. The CPAs under the programme are therefore additional and this will be demonstrated at the CPA level as per the *"Standard for the demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities",* version 01.0 (EB 65 Report, Annex 3). As per paragraph 9 of the standard, the related requirements have been included in the eligibility criteria for this PoA (See Section K below).

SECTION D. Start date and duration of PoA

D.1. Start date of PoA

>>
The validation start date (11/09/2012)

D.2. Duration of PoA

>>
28 years 0 Months

SECTION E. Environmental impacts

E.1. Level at which environmental impacts analysis is undertaken

>>
The analysis of the environmental impacts is performed at the PoA level.

The objective of the SSC-PoA is the design, manufacture, procurement, promotion, awareness creation, distribution and sale of ECSs in Sub-Saharan African Countries. Due to its small scale nature, together with its positive social and environmental benefits and absence of negative impacts, and acknowledging that the impact of the distribution of millions of ECSs in Sub-Saharan African region is best assessed from a macro perspective, as per the requirements of the CDM modalities and procedures, environmental analysis is undertaken at a PoA level.

Where local regulation or laws require the conduct of an Environmental Impact Assessment (EIA), the EIA will be carried out at the CPA level.

E.2. Analysis of environmental impacts

>>
The following environmental benefits of the PoA have been identified:

- *Air quality:* Children and mothers will be exposed to fewer air pollutants through reduced emission of not only carbon dioxide, but also carbon monoxide and particulate matter. Air pollution from cooking with solid fuel is a key risk factor for childhood pneumonia as well as many other respiratory, cardiovascular and ocular diseases[35].
- *Biodiversity:* will be improved as the programme reduces deforestation and pressure on remaining forest reserves in Sub-Saharan African Countries.

No negative impacts can be identified.

E.3. Environmental impact assessment

>>
N/A

SECTION F. Local stakeholder consultation

F.1. Level at which local stakeholder consultation is undertaken

>>
The local stakeholder consultation process is performed at the CPA level.

Each CPA operates within a geographically defined region and within any one of the Host Countries. For this reason local stakeholder consultation is done at the CPA level to ensure that the stakeholders within the region that are actually affected by the project activity are adequately informed and consulted.

Comments from the local stakeholders will be invited through any of the following means:

- Public meetings
- Individual consultations
- Public advertisement

F.2. Modalities for local stakeholder consultation

>>
Not applicable

F.3. Summary of comments received

>>
Not applicable

F.4. Consideration of comments received

>>
Not applicable

[35] http://www.thecitizen.co.tz/business/13-local-business/994-well-introduce-fuel-saving-stoves-in-local-market-ngo.html

SECTION G. Approval and authorization

>>
The letter of approval from Party(ies) which wishes to be involved in the PoA is not available at the time of submitting the PoA-DD to the validating DOE.

The CME and the Implementers of the CookClean Ghana Limited —CPA01 have applied to the Ghana DNA for Host Country Approval.

The CME has received LoA from the Kenyan DNA for Host Country Approval for CPA03.

PART II. Generic component project activity (CPA)

SECTION H. Description of generic CPA

H.1. Title of generic CPA

>>
N/A

H.2. Reference number of generic CPA

>>
CPA0XX

H.3. Purpose and general description of generic CPA

>>
The purpose of each CPA is to promote the use of efficient or improved charcoal stoves (ECS) which provide the same service with significantly less fuel than the traditional charcoal stoves in common use in Ghana, Kenya and any other future target countries within the Sub-Saharan African Region. The CPAs aim to establish regular use of efficient charcoal stoves (ECS) by distributing about ECS in any one year. The adoption and usage of the improved cook-stoves therefore constitutes the project scenario for any of the CPAs to be included in the PoA.

The CME will support the SSC-CPA implementer(s) in implementing the CDM Programme Activities (CPAs) in Ghana, Kenya and any other target Sub-Saharan African Countries that could be added to the PoA in future. The CME will be responsible for the carbon asset development, including taking the PoA-DD through validation and registration, inclusion of CPAs in the PoA reviewing the monitoring data for each CPA, and preparing the monitoring reports.

A typical CPA will be located within the PoA geographical boundary and replace inefficient traditional charcoal cookstoves with efficient improved charcoal cookstoves within Ghana and Kenya, with the possibility of expansion into other Sub-Saharan African Countries. By reducing non-renewable charcoal consumption, the project activity shall reduce greenhouse gas (GHG) emissions generated through the use of non-renewable charcoal.

Under a CPA, the Programme Activity Implementer (PAI), will adapt an appropriate ECS design, which it will manufacture, create awareness of, market, distribute and sell on a commercial basis through appropriate agents developed by the company within the project host country. The company will also collect and store stoves sales data and maintain the Sales Database while providing the after sales service to the users. The PAI will act individually, running the project in accordance with the demand of the local market.

The PAI will set up and apply procedures, appropriate records and documentation control process to assert legal rights of the carbon credits generated and to avoid double counting. Through a Warranty Card system, or some other appropriate system, the PAI will transfer the information of each ECS sold to the Sales Database, which will ensure that no ECS is counted more than once under the CPA. The Sales Database will also serve as the basis for the calculation of CERs

Accordingly, the PAI will use the CER proceeds to reduce costs of ECS to users, provide maintenance and recoup associated costs for the dissemination of stoves, such as the development of the supply chain personnel and systems, marketing activities and building new manufacturing units.

In return, the households or end users of the stoves will purchase the stoves at the lower prices from the PAIs or their agents, use the stoves for cooking activities instead of the traditional ones in the prescribed manner and transfer carbon rights to the PAIs.

H.4. Technologies/measures

>>

The project promotes wide-spread manufacture and use of various types of efficient charcoal stoves developed to match market interest in various regions of Sub-Saharan Africa. The main stove design is an adaptation of the Pulamusa[36] stove developed by ProBEC in Zambia after extensive research into the manufacturing of energy efficient stoves and other thermal technologies. The principal stove design features a pot-skirt and a conical grate or some other technologically equivalent design feature that improves the efficiency of charcoal stoves and their demand, depending on the locally available skills and resources. The stoves will be constructed by local trained technicians working mostly in centralised manufacturing workshops operated and managed by the PAIs. The main focus of the PoA will be the design or adoption of an appropriate design, manufacture, promotion and awareness creation, distribution and sale of the ECSs. The stoves are made of Galvanised/Mild Steel Plate and can be produced by a PAI in a range of sizes depending on the needs of the target users.

The ECSs are more efficient than traditional charcoal stoves as they reduce the heat loss and market trials have shown that the Pulamusa design is popular. Pilot trials and field tests have shown significant fuel savings compared to the baseline traditional charcoal stove, with commensurate cash expenditure savings by low-income families. Water boiling tests carried out on the project domestic model envisioned for the first SSC-CPA has shown that it has a thermal efficiency higher than 40%[37].

During the life of the project, research and development work may result in more efficient ECS designs, which shall be absorbed by this PoA, subject to the appropriate tests proving real and measurable quantity of charcoal saved.

The PAIs are encouraged to invest in research and development for the improvement of the current ECS being disseminated. It is also encouraged that know-how as to the design and construction of improved stoves proven in other countries be transferred to Ghana and the Sub-Saharan Region as part of the CPAs. This technology transfer could be from other countries which have developed affordable technologies suitable for the PoA covered region and markets

The detailed description of the specific ECS design and the main manufacturing and/or production technologies, systems and equipment involved will be defined at the CPA level.

SECTION I. Application of selected methodologies and standardized baselines

I.1. Reference to methodologies and standardized baselines

>>

[36] http://www.probec.org/displaysection.php?czacc=&zSelectedSectionID=sec1192753796&zSelectedAssetID=ast1217834847

[37] See Water Boiling Test Results for CookMate carried out by the Institute of Industrial Research (IIR) of the Council for Scientific and Industrial Research (CSIR), Ghana.

The small scale approved baseline and monitoring methodology AMS-II.G; “Energy efficiency measures in thermal applications of non-renewable biomass”; Version 04 (EB 68, Annex 23). Refer http://cdm.unfccc.int/methodologies/DB/6U8JYO9XTLVZ8LJ7GUBSZP145BIDG2

This approved baseline and monitoring methodology, AMS-II.G, vers. 04.0, is applicable to CPAs under the PoA as per the PoA rules.

I.2. Applicability of methodologies and standardized baselines

>>

The use of this methodology in a project activity under a programme of activities is legitimate if the leakages due to the use of non-renewable biomass saved elsewhere and due to the PoA implementation as explained in AMS-II.G, version 04.0 are both accounted for.

Under the PoA, the two potential sources of leakage have been provided for by multiplying B_{old} by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

The value of fraction of non-renewable (f_{NRB}) applied in a component project activity (CPA) of a POA will be determined either by use of default national values approved by the Board (where available) or by calculation using the “Information note; Default values of fraction of non-renewable biomass for least developed countries and small island developing states, version 01.0 (EB 67, Annex 22)

The applicable methodology is applied across the PoA: AMS-II.G, version 04.0, “Energy Efficiency measures in thermal applications of non-renewable biomass”.

Applicability Requirement of AMS.IIG, Version 04	CPAs under the PoA	Criteria Met?
This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency biomass fired cook stoves or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers.	Each CPA will involve the distribution of energy efficient charcoal cook stoves	Yes
Single pot or multi pot portable or in-situ cook stoves with specified efficiency of at least 20%. The efficiency of the stoves shall be tested by a national standards body or by an appropriate certifying agent recognised by it. Alternatively, manufacturer specifications on efficiency based on water boiling test (WBT) may be used	Only charcoal stove with efficiency levels of at least 20% will be included in the CPAs as per the technical specification/test results from independent testers either through Thermal Energy Output (TEO), Kitchen Performance Test (KPT), Water Boiling Test (WBT) or Controlled Cooking Test (CCT) on annual basis. The efficiency tests shall be carried out by either the national standards body, other appropriate national body or an agent recognised by it, or manufacturer specifications on efficiency based on water boiling test (WBT).	Yes
Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics	Each PIA will be able to show that non-renewable biomass has been used since 31 December 1989, using published literature, official reports or statistics. Compliance with this applicability condition is part of the CPA eligibility criteria and it will be shown in the CPA-DD.	Yes
The project participants shall apply the general guidelines to SSC CDM methodologies.	On average each ECS used saves considerably less than 1% of the energy limit for Type II projects using small-scale methodologies. The CPAs are each small-scale and do not exceed the threshold (180 GWh) for thermal savings. This will be verified at the time of inclusion of the CPA into the PoA and shall be documented in the CPA-DD.	Yes
Specific criteria expected by the methodology for project activity under PoA: a) Use of non-renewable woody biomass saved under the project activity to justify the baseline of	As provided for in AMS.II.G Version 04.0, as an alternative to subparagraphs (a) and (b) of paragraph 22, B_{old} has been multiplied by a net to gross adjustment factor of 0.95 to account for the PoA-related leakages, in which case surveys	Yes

other CDM project activities can also be a potential source of leakage; b) Increase in the use of non-renewable woody biomass outside the project boundary to create non-renewable woody biomass baselines can also be a potential source of leakage	are not required.	

Sampling will be undertaken as part of a Sampling Plan that is in line with the requirements of:

i. the methodology AMS-II.G, Version 04.0
ii. "Standard for sampling and surveys for CDM project activities and programme of activities, vers 03.0; EB69, Annex 4.

Wherever reasonably possible, the PoA Sampling Plan will ensure that sample sizes are large enough to meet 95/5 precision in the case of biannual sampling, and 90/10 precision in the case of annual sampling. In cases where such precision is not achieved, the lower bound of a 90%/95% confidence interval of the parameter value will be used as allowed by the methodology. Depending on the CPAs that are included in the PoA, simple random sampling may be appropriate; in other cases stratified random sampling may be more appropriate. Where stratified random sampling is applied, the weighted average will be calculated and used for emission reduction estimation. The CME will provide guidance to the CPA implementer and/or any other parties that will be involved in carrying out sampling activities as part of the monitoring plan.

It is planned that individual verifications shall be done for each CPA, as all CPAs shall be owned by different companies and shall be verified separately. Thus PoA level sampling has not been considered as it is not applicable.

On annual basis, the following will be determined through sampling and testing in accordance with the "Standard for sampling and surveys for CDM project activities and Programme of Activities", Version 03.0 and the methodology AMS-II.G, Version 04:

The efficiency of the project stoves (η_{new})
The rate of drop off of the stoves in year *y*, DO_y.
Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass ($f_{NRB,y}$)

Since annual inspection is to be applied, a 90% confidence interval and a 10% margin of error will be achieved for the sampling parameters above. In case the 90/10 precision is not achieved, the lower bound of a 90% confidence interval of the parameter value will be chosen.

I.3. Application of multiple methodologies

>>
N/A

I.4. Project boundary, sources and greenhouse gases (GHGs)

>>

As per the methodology, the CPA boundary is the physical, geographical site of the efficient systems using biomass.

Source		Gas	Included?	Justification / Explanation
Baseline	Combustion of non-renewable biomass for cooking in inefficient cook stoves. Emission Factor for combustion of fossil fuels for cooking.	CO_2	Yes	Major source of emissions
		CH_4	No	Not included in respect of AMS.II.G, ver 04
		N_2O	No	Not included in respect of AMS.II.G, ver 04
Project activity	Combustion of non-renewable biomass for cooking in efficient cook stoves. Emission Factor for combustion of fossil fuels for cooking.	CO_2	Yes	Major source of emissions
		CH_4	No	Not included in respect of AM.SII.G, ver 04
		N_2O	No	Not included in respect of AMS.II.G, ver 04

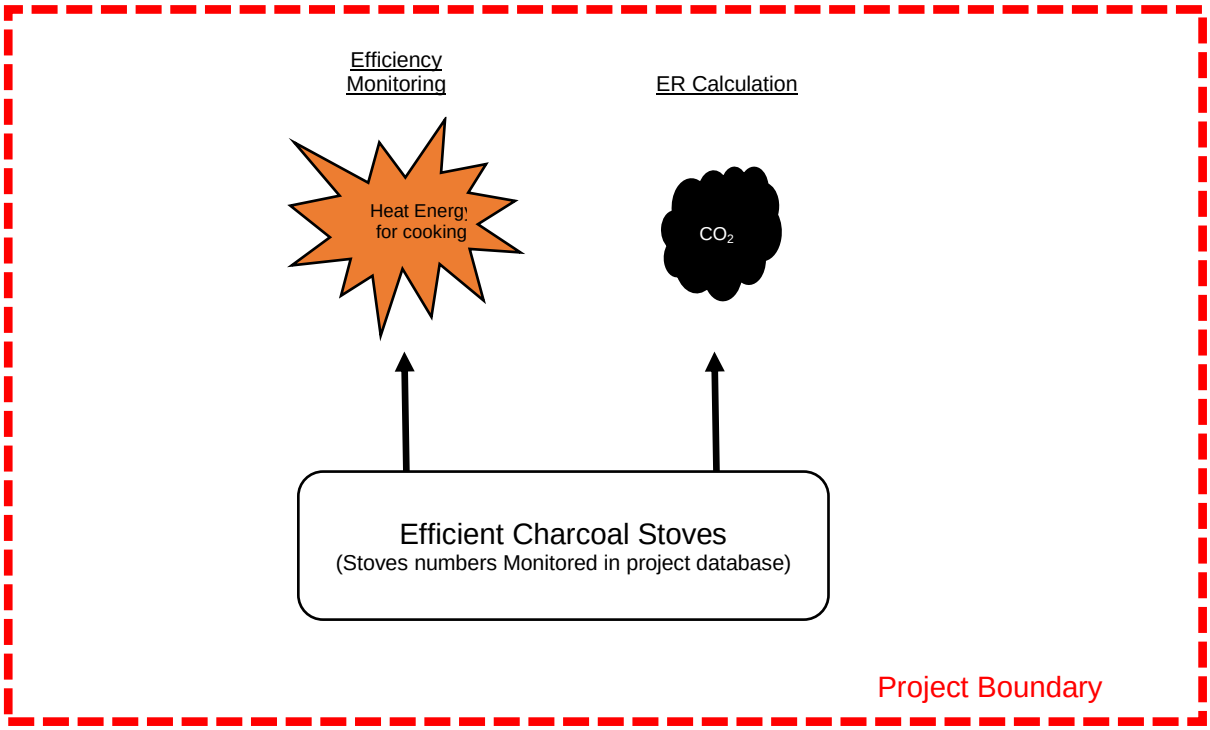


Figure 2: Project Boundary of a typical CPA.

I.5. Establishment and description of baseline scenario

>>

According to the methodology applied, it is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs (Paragraph 4 of AMS-II.G, Version 04.0).

Each CPA being proposed will disseminate efficient cook stoves with a higher thermal efficiency which will replace baseline stoves with lower efficiencies. This action will lead to a reduction in the use of non-renewable biomass.

The thermal needs are established either through use of historical published data or a baseline survey using the Kitchen Performance Testing protocol (http://www.pciaonline.org/node/1049). The survey is carried out at a 90% confidence interval and a 10% margin of error. In case the 90/10

precision is not achieved, the lower bound of a 90% confidence interval of the parameter value will be chosen.

Therefore, the emission reductions achieved by a typical CPA will be calculated ex-ante as per AMS IIG, Version 04 as follows:

$$ER_y = B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel} \quad \textbf{(1)}$$

Where:

ER_y	Emission reductions during the year *y* in tCO_2e
$B_{y,savings}$	Quantity of woody biomass that is saved by the CPA in period y in tonnes.
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass in %. Details on how $f_{NRB,y}$ is determined are provided in section B.4.1 of each CPA-DD and is determined at the country level. Where default values endorsed by designated national authorities and approved by the Board are available at (http://cdm.unfccc.int/DNA/fNRB/index.html), they are applied. Where, they are not available they are calculated according to the guidelines of the "Information note; Default values of fraction of non-renewable biomass for least developed countries and small island developing states, version 01.0 (EB 67, Annex 22).
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO2/TJ[38]

Quantity of woody biomass that is saved by the CPA is estimated using Option 2 as follows:

$$B_{y,\ savings} = (B_{old} * (1 - \eta_{old}/\eta_{new}) \quad \textbf{(3)}$$

Where:

$B_{y,,savings}$	The quantity of woody biomass that is saved by project activity in period *y* in tonnes.
B_{old}	*Quantity of woody biomass used in the absence of the project activity in tonnes* B_{old} is determined as the product of number of appliances in use during the year and the average annual fuel combustion per baseline appliance. To determine B_{old} , the baseline charcoal consumption is multiplied by 6. This is

[38] This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50% weight is assigned to coal as the alternative solid fossil fuel (96 tCO_2/TJ) and a 25% weight is assigned to both liquid and gaseous fuels (71.5 tCO_2/TJ for Kerosene and 63.0 tCO_2/TJ for Liquefied Petroleum Gas (LPG).

	based on last paragraph of page 1.45 of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*[39], which states as follows: *"If no local information is available, 6 kg of wood input per kg of charcoal may be used as default (FAO, 1990)".*
η_{old}	Efficiency of the system being replaced, measured using representative sampling methods (fraction). The default value of 0.10 has been applied for the CPA
η_{new}	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol. Use weighted average values since 3 sizes of stoves are being introduced by the project activity

For clarity and in order to derive B_{old} from the baseline fuel use survey, parameters representing the average annual consumption of woody biomass per baseline appliance ($B_{old,\ appliance}$) and the average annual consumption of charcoal per baseline appliance ($B_{old,\ appliance,\ survey}$) have been introduced. Also the following "own" equation has been introduced to account for the leakages due to the NRB (L_{NRB}) and the PoA (L_{PoA}) and also to convert from quantity of charcoal to quantity of biomass (multiply by 6)[40]

$$B_{old,\ appliance} = B_{old,\ appliance,\ survey} * 6 * L_{NRB} * L_{POA} \quad \textbf{(3.1)}$$

Where:

$B_{old,\ appliance}$	The average quantity of woody biomass used in the absence of the project activity by each appliance in tonnes.
$B_{old,\ appliance,\ survey}$	The average quantity of charcoal used in the absence of the project activity by each appliance in tonnes (as determined by the baseline survey).
L_{NRB}	Leakage factor as per Clause 13(a) of AMS-II.G, Version 04.0. Use a value of 0.95 There will be no transfer or use of old equipment from outside the project boundary.
L_{POA}	Leakage factor as per Clause 22(c) of AMS-II.G, Version 04.0. Use a value of 0.95 There will be no transfer or use of old equipment from outside the project boundary.

To determine the number of appliances in use in year y (N_y) for ex-ante calculations, an average stove life of 4 years and a drop out rate (DO_y) of 5% are assumed. For ex-post calculations, drop-off rate will be statistically determined. To compensate for the actual operating days for a given stove, N_y is further adjusted for the proportion of the year during which the stoves are in use using the factor, $mp_{length}/365$ (where mp_{length} is the number of days the a stove is in use during the year). The number of stoves in use, assuming a 4-year life, ($N_{y,no\text{-}adjusted)}$ is then adjusted for the drop using the equation:

[39] See http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf

[40] To determine B_{old} , the baseline charcoal consumption is multiplied by 6. This is based on last paragraph of page 1.45 of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*[40], which states as follows:

"If no local information is available, 6 kg of wood input per kg of charcoal may be used as default (FAO, 1990)".

$$N_y = N_{y,non\text{-}adjusted} * (1-DO_y) * mp_{length}/365 \quad \textbf{(3.2)}$$

The quantity of woody biomass that is saved by the CPA in period *y* in tonnes is then calculated from the equation (3.2) below in order to correct for drop-out rate and days of use.

$$B_{y,\ savings,} = B_{y,\ savings,\ appliance} * N_y \quad \textbf{(3.3)}$$

Where:

$B_{y,\ savings}$	Quantity of woody biomass that is saved by the CPA in period y in tonnes.
$B_{y,saving\ appliance}$	The average quantity of woody biomass that is saved by each project appliance in period *y* in tonnes.
$N_{y,\ non\text{-}adjusted}$	The number of ECS in operation in year *y* before adjustment for the stoves not in use. The value of $N_{y,\ non\text{-}adjusted}$ depends on the sales rate and the expiry rate of the project stoves and is designed to ensure that the number of operational stoves does not exceed the energy-saving threshold prescribed for Type II methodologies. $N_{y,\ non\text{-}adjusted}$ will be adjusted according to the share of users found not to use the project stoves by applying a Drop-Out Rate Factor (DO_y) as in equation (3.2) to determine N_y.
Ny	The number of ECS in operation in year *y* adjusted for the stoves not in use.
DO_y	The percentage of stoves sold by the PAI which are no longer in use (Drop-Out Rate). As per paragraph 16 of AMS IIG, the percentage of stoves sold by the PAI which are no longer in use (the Drop-Out Rate, DO_y), will be found by sampling. This sample will be biennial
mp_{length}	Length of monitoring period. For ex-ante calculations, a value 365 days per year is assumed.

In addition, the future Kitchen Surveys also investigate the extent to which baseline stoves are no longer used, even in a secondary role, in the houses and communities adopting the ECS. If it is found that a portion of kitchens exists in which a traditional stove is still used, even in a secondary role, emission reductions will be calculated taking into account only the portion of the wood used in ECS.

Sampling will be undertaken as part of a Sampling Plan that is in line with the requirements of AMS II.G V.04.0 and the Standard for sampling and surveys for CDM project activities and programme of activities, EB69, Annex 4. Wherever reasonably possible, the PoA Sampling Plan will ensure that sample sizes are large enough to meet 95/5 precision in the case of biannual sampling, and 90/10 precision in the case of annual sampling. In cases where such precision is not achieved, the lower bound of a 90%/95% confidence interval of the parameter value will be used as allowed by the methodology. Depending on the CPAs that are included in the PoA, simple random sampling may be appropriate; in other cases stratified random sampling may be more appropriate. The CME will provide guidance to the CPA implementer and/or any other parties that will be involved in carrying out sampling activities as part of the monitoring plan.

Fraction of Non-Renewable Biomass

Using published country-specific data, it will be established that non-renewable biomass has been used since 31 December 1989, within the geographic boundary (Ghana, Kenya, and possibly in future, other target Sub-Saharan African Countries) where the CPA is implemented. This will be done for each CPA.

The fraction of non-renewable biomass (f_{NRB}) will be calculated in accordance with the "Information note; Default values of fraction of non-renewable biomass for least developed countries and small island developing states, version 01.0 (EB 67, Annex 22)[41] as follows:

A national-level default fraction of non-renewable biomass (f_{NRB}), in %, is calculated from the equation below:

$$fNRB = \frac{NRB}{NRB + DRB} \quad (1)$$

Where,

NRB	Non-renewable biomass (t/yr).
DRB	Demonstrably renewable biomass (t/yr)

The Total Annual Biomass Removals (R) from the specific country will be calculated as a proxy for the quantity of woody biomass used in the absence of the project activity (B_y) and estimating the proportion of R that is demonstrably renewable (DRB) and non-renewable (NRB) using equations below:

$$NRB = R - DRB \quad (2)$$

Where,

R	Total annual biomass removals (t/yr)

The Total Annual Biomass Removals (R) for each country is inferred by calculating the sum of the Mean Annual Increment in biomass growth (MAI) and the Annual Change in Living Forest Biomass stocks (ΔF). Given biomass growth (MAI) and change in stock (ΔF) are both known, the balancing removals (R) is calculated as the sum of the two as follows:

$$R = MAI + \Delta F \quad (3)$$

Where,

MAI	Mean Annual Increment in biomass growth (t/yr)
ΔF	Annual Change in Living Forest Biomass stocks (t/yr)

The Mean Annual Increment of biomass growth (MAI) is calculated in equation 4 below as the product of the Extent of Forest (F) in hectares and the Ghana Growth Rate (GR) of the Mean Annual Increment as follows:

$$MAI = F \times GR \quad (4)$$

Where,

F	Extent of Forest (ha)

[41] The approach is applicable to all LDC and countries and parties which had fewer than 10 registered clean development mechanism project activities as of 31 December 2010. This will be the case for all the countries covered by the PoA.

GR	Annual Growth rate of biomass (t/ha-yr)

The demonstrably renewable biomass (DRB) is calculated in equation 5 below as the product of Protected Area Extent of Forest (PA) in hectares and the country-specific Growth Rate (GR) of the Mean Annual Increment:

$$DRB = PA \times GR \quad (5)$$

Where,

PA	Protected Area Extent of Forest (ha)
GR	Annual Growth rate of biomass (t/ha-yr)

The parameters used and the data sources will be summarised in a table as below:

Country NRB Estimation: Based on EB67, Annex 22

Parameter	Description	Equation	Value	Data Source	Considerations
$f_{NRB,}$ %	Fraction of non-renewable biomass	*NRB/(NRB+DRB)*		Calculated as per equation 1 (EB 67, Annex 22)	
NRB, t/yr	Non-renewable woody biomass	*R-DRB*		Calculated as per equation 2 (EB 67, Annex 22)	Proportion of Total Annual Biomass Removals (R) that is not demonstrably renewable
DRB, t/yr	Demonstrably renewable biomass	*PA*GR*		Calculated as per equation 5 (EB 67, Annex 22)	Calculated as equivalent to the total annual biomass growth in protected areas
R, t/yr	Total Annual Biomass Removals	*MAI+ΔF*		Calculated as per equation 3 (EB 67, Annex 22)	Used as a national-level proxy for B_y. Accounts for all removals (not only woodfuels), which is equivalent to the sum of Mean Annual Increment of biomass growth and the Annual change in living forest biomass.
MAI, t/yr	Mean Annual Increment of biomass growth	*F*GR*		Calculated as per equation 4 (EB 67, Annex 22)	Country-specific MAI calculated from extent of forest and its growth rate.

ΔF, t/yr	Annual change in living forest biomass			Annual change in living stock biomass 2005-2010 (FAO Forest Resource Assessment 2010 Global Tables, Table 11. Carbon. stock/Biomass Conversion rate (2003 IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry): 0.5 is used as a default for carbon fraction of dry matter	The Annual Change in Carbon Stock in Living Forest Biomass 2005-2010 (t-carbon/yr) from Table 11 (-8,000,000 t-carbon/yr for Ghana) is converted to Annual Change in Living Forest Biomass 2005-2010 (t/yr) by diving with 0.5, the default value for conversion. See http://www.fao.org/docrep/013/i1757e/i1757e.pdf and http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf
F, ha	Extent of forest			FAO Forest Resource Assessment (FRA) 2010 Global Tables, Table 2	See http://www.fao.org/docrep/013/i1757e/i1757e.pdf
GR, t/ha-yr	Annual Growth rate of biomass			Distribution of total forest area by ecological zone (FAO Global Forest Resource Assessment 2000, Table 14; http://www.fao.org/DOCREP/004/Y1997E/y19997e21.htm #bm73). Above ground biomass growth rates (t/ha-yr) for different ecological zones (2006 IPCC Guidelines for National Greenhouse Gas	growth rate has been calculated as the weighted average based on FAO reporting on distribution of total forest area by ecological zone and IPCC above-ground biomass growth rates for different ecological zones: Tropical rain forest at 47%, tropical moist forest at 32% and tropical dry forest at 21%.

				Inventories, Chapter 4, Table 4.9)	
PA, ha	Protected Area Extent of Forest			FAO Forest Resource Assessment (FRA) 2010 Global Tables, Table 6	
	Annual change in carbon stocks in living forest biomass (2005-2010); t/yr			FAO Forest Resource Assessment (FRA) 2010 Global Tables, Table 11	
	Carbon stock/biomass conversion rate			Default value (EB 67, Annex 22)	

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

>>
The equations have been described under Section I.5 above.

The non-renewability of the biomass used and the fraction of non-renewable biomass saved (f_{NRB}) will be determined at the CPA-level.

The fraction of non-renewable biomass (f_{NRB}) will be calculated at the national level in accordance with the "Information note; Default values of fraction of non-renewable biomass for least developed countries and small island developing states, version 01.0 (EB 67, Annex 22) .

I.6.2. Data and parameters fixed ex ante

Data / Parameter:	η_{old}
Data unit:	Fraction
Description:	Efficiency of the system being replaced, measured using representative sampling methods or based on referenced literature values (fraction), use weighted average values if more than one type of system is being replaced

Source of data:	Default value in AMS-II.G, vers 04.0
Value(s) applied:	0.10
Choice of data or Measurement methods and procedures:	According to the methodology, 0.10 default value may be optionally used if the replaced system is the three stone fire or a conventional system lacking improved combustion air supply mechanism and flue gas ventilation system i.e. without a grate and without a chimney. The replaced systems in the project area will be conventional system lacking improved combustion air supply mechanism and flue gas ventilation system.
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	L_{NRB}
Data unit:	-
Description:	Net-to-gross adjustment factor for NRB Leakage (fixed parametric value of 0.95)
Source of data:	AMS-II.G; Version 04.0
Value(s) applied:	0.95
Choice of data or Measurement methods and procedures:	As per the methodology AMS II.G, vers. 04.0, a default value as provided under par. 13 can be optionally used to account for NRB leakage, in which case surveys are not required. See Part II, Section I.6.3 of this document for details.
Purpose of data	Calculation of leakage
Additional comment:	The 0.95 PoA leakage factor will be applied to all CPAs

Data / Parameter:	L_{POA}
Data unit:	-
Description:	Net-to-gross adjustment factor for PoA Leakage (fixed parametric value of 0.95)
Source of data:	AMS-II.G; Version 04.0
Value(s) applied:	0.95
Choice of data or Measurement methods and procedures:	As per the methodology AMS II.G, ver. 04.0, a default value as provided under par. 22 can be optionally used to account for PoA leakage, in which case estimates of the leakage are not required. See Part II, Section I.6.3 of this document for details.
Purpose of data	Calculation of leakage
Additional comment:	The 0.95 PoA leakage factor will be applied to all CPAs

Data / Parameter:	$EF_{projected\_fossilfuel}$
Data unit:	tCO_2/TJ
Description:	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data:	AMS-II.G; Version 04.0
Value(s) applied:	81.6
Choice of data or Measurement methods and procedures:	This is the IPCC default value as provided by AMS II.G (Version. 04.0), paragraph
Purpose of data	Calculation of baseline emissions
Additional comment:	-

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/tonne

Description:	Net calorific value of the non-renewable woody biomass that is substituted
Source of data:	AMS-II.G; Version 04
Value(s) applied:	0.015
Choice of data or Measurement methods and procedures:	This is the IPCC default value for non-renewable woody biomass that is substituted as provided by AMS II.G (Version. 04.0), paragraph 5
Purpose of data	Calculation of baseline emissions
Additional comment:	-

Data / Parameter:	$B_{old,\ appliance,\ survey}$
Data unit:	Tonnes per stove
Description:	The average quantity of charcoal used in the absence of the project activity per appliance(stove)
Source of data:	A survey of local baseline stove usage or derived from historical data
Value(s) applied	XXX
Choice of data or Measurement methods and procedures:	$B_{old,\ appliance,\ survey}$ is determined at 90/10 precision through appropriate sampling methods for the Kitchen Performance Test (KPT) protocol. B_{old} is calculated from $B_{old,\ appliance,survey}$ The KPT should be carried out in accordance with national standards (if available) or international standards or guidelines e.g. the KPT procedures specified by the Partnership for Clean Indoor Air (PCIA); http://www.pciaonline.org/node/1049
Monitoring frequency:	Calculation of baseline emissions
QA/QC procedures:	This parameter is determined once for each region where the stoves are to be sold, when adding a new CPA.
Purpose of data	Calculation of baseline emissions
Additional comment:	

I.6.3. Modalities for ex ante calculation of emission reductions

>>

Emission reduction of each SSC-CPA is calculated as per AMS II.G Energy Efficiency measures in thermal application of non-renewable biomass; Version 04.0; EB 68.

The following are the parameters and equations used to calculate the emission reductions:

$$ER_y = B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel} \quad \textbf{(1)}$$

Substituting the known values;

$ER_y = B_{y,savings} * f_{NRB,y} * 0.015 * 81.6$

ER_y	Emission reductions during the year *y* in tCO_2e
$B_{y,savings}$	Quantity of woody biomass that is saved by the CPA in period y in tonnes.

$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in period y that can be established as non-renewable biomass in %. Details on how $f_{NRB,y}$ is determined are provided in section B.4.1 of each CPA-DD and is determined at the country level. Where default values endorsed by designated national authorities and approved by the Board are available at (http://cdm.unfccc.int/DNA/fNRB/index.html), they are applied. Where, they are not available, they are calculated according to the guidelines of the *"Information note; Default values of fraction of non-renewable biomass for least developed countries and small island developing states,* version 01.0 (EB 67, Annex 22).
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO2/TJ[42]

Quantity of woody biomass that is saved by the CPA is estimated using Option 2 as follows:

$$B_{y,\,savings} = (B_{old}*(1-\eta_{old}/\eta_{new}) \quad \textbf{(3)}$$

Substituting the known values;

$$B_{y,\,savings} = (B_{old}*(1-0.1/\eta_{new})$$

Where:

$B_{y,savings}$	The quantity of woody biomass that is saved by project activity in period *y* in tonnes.
B_{old}	*Quantity of woody biomass used in the absence of the project activity in tonnes* B_{old} is determined as the product of number of appliances in use during the year and the average annual fuel combustion per baseline appliance. To determine B_{old} , the average annual charcoal consumption of the baseline appliance is multiplied by 6. This is based on last paragraph of page 1.45 of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*[43], which states as follows: *"If no local information is available, 6 kg of wood input per kg of charcoal may be used as default (FAO, 1990)".*
η_{old}	Efficiency of the system being replaced, measured using representative sampling methods (fraction). The default value of 0.10 has been applied for the CPA

[42] This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50% weight is assigned to coal as the alternative solid fossil fuel (96 tCO_2/TJ) and a 25% weight is assigned to both liquid and gaseous fuels (71.5 tCO_2/TJ for Kerosene and 63.0 tCO_2/TJ for Liquefied Petroleum Gas (LPG).

[43] See http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf

η_{new}	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol. Use weighted average values since 3 sizes of stoves are being introduced by the project activity

For clarity and in order to derive B_{old} from the baseline fuel use survey, parameters representing the average annual consumption of woody biomass per baseline appliance ($B_{old,\ appliance}$) and the average annual consumption of charcoal per baseline appliance ($B_{old,\ appliance,\ survey}$) have been introduced. Also the following "own" equation has been introduced to account for the leakages due to the NRB (L_{NRB}) and the PoA (L_{PoA}) and also to convert from quantity of charcoal to quantity of biomass (multiply by 6)[44]

$$B_{old,} = B_{old,\ appliance} * N_y \quad \textbf{(3.1)}$$

$$B_{old,\ appliance} = B_{old,\ appliance,\ survey} * 6 * L_{NRB} * L_{POA} \quad \textbf{(3.1.1)}$$

Substituting the known values in equations 3.1.1 and 3.1;

$B_{old,\ appliance} = B_{old,\ appliance,\ survey} * 6 * 0.95 * 0.95$ (equation 3.1.1)

$B_{old,} = B_{old,\ appliance,\ survey} * 6 * 0.95 * 0.95 * N_y$ (equation 3.1)

Where:

$B_{old,\ appliance}$	The average quantity of woody biomass used in the absence of the project activity by each appliance in tonnes.
$B_{old,\ appliance,\ survey}$	The average quantity of charcoal used in the absence of the project activity by each appliance in tonnes (as determined by the baseline survey).
L_{NRB}	Leakage factor as per Clause 13(a) of AMS-II.G, Version 04.0. Use a value of 0.95 There will be no transfer or use of old equipment from outside the project boundary.
L_{POA}	Leakage factor as per Clause 22(c) of AMS-II.G, Version 04.0. Use a value of 0.95 There will be no transfer or use of old equipment from outside the project boundary.

To determine the number of appliances in use in year y (N_y) for ex-ante calculations, an average stove life of 4 years and a drop out rate (DO_y) of 5% are assumed. For ex-post calculations, drop-off rate will be statistically determined. To compensate for the actual operating days for a given stove, N_y is further adjusted for the proportion of the year during which the stoves are in use using the factor, $mp_{length}/365$ (where mp_{length} is the number of days the a stove is in use during the year). The number of stoves in use, assuming a 4-year life, ($N_{y,non\text{-}adjusted}$), is then adjusted for the drop using the equation:

$$N_y = N_{y,non\text{-}adjusted} * (1 - DO_y) * mp_{length}/365 \quad \textbf{(3.2)}$$

[44] To determine B_{old} , the baseline charcoal consumption is multiplied by 6. This is based on last paragraph of page 1.45 of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*[44], which states as follows:

"If no local information is available, 6 kg of wood input per kg of charcoal may be used as default (FAO, 1990)".

Substituting the known values;

$N_y = N_{y,non\text{-}adjusted}*(1-0.5)* 365/365$

$N_y = N_{y,non\text{-}adjusted}*0.95$

Equation 3.1 therefore becomes;

$B_{old,} = B_{old,\ appliance,\ survey}*6*0.95*0.95* N_{y,non\text{-}adjusted}*0.95$ (equation 3.1); and equation 3 becomes;

$B_{y,\ savings,} = B_{old,\ appliance,\ survey}*6*0.95*0.95* N_{y,non\text{-}adjusted}*0.95(1-0.1/\eta_{new})$

The above calculation gives the quantity of woody biomass that is saved by the CPA in period *y* in tonnes is then calculated from the equation (3.1) below in order to correct for drop-out rate and days of use.

Where:

$B_{y,\ savings}$	Quantity of woody biomass that is saved by the CPA in period y in tonnes.
$B_{y,saving\ appliance}$	The average quantity of woody biomass that is saved by each project appliance in period *y* in tonnes.
$N_{y,\ non\text{-}adjusted}$	The number of ECS in operation in year *y* before adjustment for the stoves not in use and actual appliance operating dyas in a year. The value of $N_{y,\ non\text{-}adjusted}$ depends on the sales rate and the expiry rate of the project stoves and is designed to ensure that the number of operational stoves does not exceed the energy-saving threshold prescribed for Type II methodologies. $N_{y,\ non\text{-}adjusted}$ will be adjusted according to the share of users found not to use the project stoves by applying a Drop-Out Rate Factor (DO_y) as in equation (3.2) to determine N_y.
η_{new}	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol. Use weighted average values since 3 sizes of stoves are being introduced by the project activity

The above calculated value of $B_{y,\ savings}$ is then applied on equation 1 to determine the emission reductions.

Fraction of Non-Renewable Biomass

Using published country-specific data, it will be established that non-renewable biomass has been used since 31 December 1989, within the geographic boundary (Ghana, with the possibility of expanding into other Sub-Saharan African Countries) where the CPA is implemented. This will be done for each CPA.

The fraction of non-renewable biomass (f_{NRB}) will be calculated in accordance with the "Information note; Default values of fraction of non-renewable biomass for least developed countries and small island developing states, version 01.0 (EB 67, Annex 22)[45] as follows:

[45] The approach is applicable to all LDC and countries and parties which had fewer than 10 registered clean development mechanism project activities as of 31 December 2010. This will be the case for all the countries covered by the PoA.

A national-level default fraction of non-renewable biomass (f_{NRB}), in %, is calculated from the equation below:

$$fNRB = \frac{NRB}{NRB + DRB} \quad (1)$$

Where,

NRB	Non-renewable biomass (t/yr).
DRB	Demonstrably renewable biomass (t/yr)

The Total Annual Biomass Removals (R) from the specific country will be calculated as a proxy for the quantity of woody biomass used in the absence of the project activity (B_y) and estimating the proportion of R that is demonstrably renewable (DRB) and non-renewable (NRB) using equations below:

$$NRB = R - DRB \quad (2)$$

Where,

R	Total annual biomass removals (t/yr)

The Total Annual Biomass Removals (R) for each country is inferred by calculating the sum of the Mean Annual Increment in biomass growth (MAI) and the Annual Change in Living Forest Biomass stocks (ΔF). Given biomass growth (MAI) and change in stock (ΔF) are both known, the balancing removals (R) is calculated as the sum of the two as follows:

$$R = MAI + \Delta F \quad (3)$$

Where,

MAI	Mean Annual Increment in biomass growth (t/yr)
ΔF	Annual Change in Living Forest Biomass stocks (t/yr)

The Mean Annual Increment of biomass growth (MAI) is calculated in equation 4 below as the product of the Extent of Forest (F) in hectares and the Ghana Growth Rate (GR) of the Mean Annual Increment as follows:

$$MAI = F \times GR \quad (4)$$

Where,

F	Extent of Forest (ha)
GR	Annual Growth rate of biomass (t/ha-yr)

The demonstrably renewable biomass (DRB) is calculated in equation 5 below as the product of Protected Area Extent of Forest (PA) in hectares and the country-specific Growth Rate (GR) of the Mean Annual Increment:

$$DRB = PA \times GR \quad (5)$$

Where,

PA	Protected Area Extent of Forest (ha)
GR	Annual Growth rate of biomass (t/ha-yr)

The parameters used and the data sources will be summarised in a table as below:

Country NRB Estimation: Based on EB67, Annex 22

Parameter	Description	Equation	Value	Data Source	Considerations
$f_{NRB,}$ %	Fraction of non-renewable biomass	*NRB/(NRB+DRB)*		Calculated as per equation 1 (EB 67, Annex 22)	
NRB, t/yr	Non-renewable woody biomass	*R-DRB*		Calculated as per equation 2 (EB 67, Annex 22)	Proportion of Total Annual Biomass Removals (R) that is not demonstrably renewable
DRB, t/yr	Demonstrably renewable biomass	*PA*GR*		Calculated as per equation 5 (EB 67, Annex 22)	Calculated as equivalent to the total annual biomass growth in protected areas
R, t/yr	Total Annual Biomass Removals	*MAI+ΔF*		Calculated as per equation 3 (EB 67, Annex 22)	Used as a national-level proxy for B_y. Accounts for all removals (not only woodfuels), which is equivalent to the sum of Mean Annual Increment of biomass growth and the Annual change in living forest biomass.
MAI, t/yr	Mean Annual Increment of biomass growth	*F*GR*		Calculated as per equation 4 (EB 67, Annex 22)	Country-specific MAI calculated from extent of forest and its growth rate.
ΔF, t/yr	Annual change in living forest biomass			Annual change in living stock biomass 2005-2010 (FAO Forest Resource Assessment 2010 Global Tables, Table 11. Carbon. stock/Biomass Conversion rate (2003 IPCC Good Practice Guidance for Land Use,	The Annual Change in Carbon Stock in Living Forest Biomass 2005-2010 (t-carbon/yr) from Table 11 (-8,000,000 t-carbon/yr for Ghana) is coverted to Annual Change in Living Forest Biomass 2005-2010 (t/yr) by diving with 0.5, the default value for conversion. See http://www.fao.org/docrep/013/i1757e/i1757e.pdf and http://www.ipcc-

				Land-Use Change and Forestry): 0.5 is used as a default for carbon fraction of dry matter	nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_04_Ch4_Forest_Land.pdf
F, ha	Extent of forest			FAO Forest Resource Assessment (FRA) 2010 Global Tables, Table 2	See http://www.fao.org/docrep/013/i1757e/i1757e.pdf
GR, t/ha-yr	Annual Growth rate of biomass			Distribution of total forest area by ecological zone (FAO Global Forest Resource Assessment 2000, Table 14; http://www.fao.org/DOCREP/004/Y1997E/y19997e21.htm#bm73). Above ground biomass growth rates (t/ha-yr) for different ecological zones (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 4, Table 4.9)	rowth rate has been calculated as the weighted average based on FAO reporting on distribution of total forest area by ecological zone and IPCC above-ground biomass growth rates for different ecological zones: Tropical rain forest at 47%, tropical moist forest at 32% and tropical dry forest at 21%.
PA, ha	Protected Area Extent of Forest			FAO Forest Resource Assessment (FRA) 2010 Global Tables, Table 6	

	Annual change in carbon stocks in living forest biomass (2005-2010); t/yr			FAO Forest Resource Assessment (FRA) 2010 Global Tables, Table 11	
	Carbon stock/biomass conversion rate			Default value (EB 67, Annex 22)	

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

Data / Parameter:	Annual energy saving per appliance
Data unit:	GWh
Description:	Annual energy saving per appliance
Source of data:	Calculated from $B_{y,saving,\ appliance}$, and $NCV_{charcoal}$
Value(s) applied	XXX
Measurement methods and procedures	Calculated as product of $B_{y,saving,\ appliance}$, and $NCV_{charcoal}$ (talen as 0.0295 TJ/t) divided by the conversion factor (TJ/GWh taken as 3.6 from IPCC 2006 Tables)
Monitoring frequency:	Annual.
QA/QC procedures:	Use of nationally approved source of data
Purpose of data	Calculation of baseline emissions
Additional comments	Used to verify that the de-bundling requirements are met

Data / Parameter:	Annual number of appliances to reach small scale threshold
Data unit:	Number
Description:	Annual number of appliances to reach small scale threshold
Source of data:	Calculated from the annual energy saving per appliance
Value(s) applied	XXX
Measurement methods and procedures	Calculated as 180 divided by annual energy saving per appliance
Monitoring frequency:	Annual
QA/QC procedures:	Use of nationally approved source of data
Purpose of data	Calculation of baseline emissions
Additional comments	Used to verify that the small scale threshold limit is not exceeded.de-bundling requirements are met

Data / Parameter:	B_{old}
Data unit:	Tonnes
Description:	Quantity of woody biomass used in the absence of the project activity
Source of data:	Calculated from $B_{old,\ appliance,survey}$ and N_y
Value(s) applied	XXX

Measurement methods and procedures	B_{old} is determined as the product below in order to correct for charcoal to biomass conversion, leakages, number of stoves in operation and the number of operational days; $B_{old,\ appliance,survey}$ *6*L_{NBR}*L_{POA}*N_y
Monitoring frequency:	Annual
QA/QC procedures:	-
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data / Parameter:	$f_{NRB,y}$
Data unit:	-
Description:	Fraction of woody biomass saved by the project activity in period *y* that can be established as non-renewable biomass in %.
Source of data:	FAO (2011): Global Forest Resource Assessment 2011, Country Reports (for the PoA participating Sub-Saharan Country); http://www.fao.org/forestry/country/en/
Value(s) applied	
Measurement methods and procedures	Calculated as provided for in AMS-II.G, version 04.0.
Monitoring frequency:	Once, at the time of inclusion of a CPA into the PoA.
QA/QC procedures:	Use of nationally approved source of data
Purpose of data	Calculation of baseline emissions
Additional comments	Details on how $f_{NRB,y}$ is determined are provided in file “Determination of NRB_ Ghana.

<table>
<tr><td>Data / Parameter</td><td>N_y</td></tr>
<tr><td>Unit</td><td>-</td></tr>
<tr><td>Description</td><td>Adjusted total number of stoves deployed until period y</td></tr>
<tr><td>Source of data</td><td>Sales Database</td></tr>
<tr><td>Value(s) applied</td><td>Refer spreadsheet</td></tr>
<tr><td>Measurement methods and procedures</td><td>The total number of stoves deployed until period y is calculated based on information monitored through the Sales Database.

$$N_y = \sum_{i=1}^{y} n_i \cdot OT_{adjusted,i,y}$$

<table>
<tr><th>Parameter</th><th>Unit</th><th>Description</th></tr>
<tr><td>n_i</td><td>-</td><td>Number of stoves deployed in period i as reported in the Sales Database and adjusted to account for delays between sales date and first use. Every appliance starts to operate (deployment date) in the month following the month in which the appliance was sold.</td></tr>
<tr><td>$OT_{adjust,i,y} = \begin{cases} 1 & ,i < y \\ \frac{d_{average,y}}{mp_{length}} & ,i = y \end{cases}$</td><td>-</td><td>Adjustment factor for reduced operational time of stoves deployed in monitoring period y, whereas i = 1, …, y. For all stoves
deployed in the periods i prior to Monitoring period y, the adjustment factor is 1.</td></tr>
<tr><td>$d_{average,y}$</td><td>days</td><td>Average number of days that the stoves deployed in period y have been operational in period y as determined by respective deployment dates of the stoves counted for n_y. Deployment dates are determined mutatis mutandis as in the context of n_i above.</td></tr>
<tr><td>mp_{length}</td><td>days</td><td>Length of monitoring period y</td></tr>
</table>
</td></tr>
<tr><td>Monitoring frequency</td><td>Continuous</td></tr>
<tr><td>QA/QC procedures</td><td>Data will be collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment:</td><td>Type of the stove will also be monitored via sampling approach or documented evidences, and in case any deployed ICS type will be found not in line with the methodology requirement, those ICS will not be counted for emission reduction calculations</td></tr>
</table>

Data / Parameter	$DO_{,y}$
Data unit:	%
Description	Statistically adjusted drop out from total population of appliances in period *y*

Source of data	A survey of local project stove usage
Value(s) applied	XXX
Measurement methods and procedures	Monitoring of the statistically adjusted drop out involves two steps: Step 1: Sample survey amongst stoves of the same type deployed under CPAs of the PoA as specified in Part II, section I.7.2 below. Step 2: Calculation of the adjusted drop-out rate at confidence level and precision as required by the methodology (AMS II.G. ver. 04.0) for the inspection frequency chosen, following the statistical standard approach for a homograde test of independent units that have a standard normal distribution. The Drop outs will be determined through interviews where it will be checked if the appliances are still operational during the biennial KPTs, performed according to the sampling procedure described in section Part II, I.7.2. Interviews will be reported in a questionnaire. Checks are conducted until the required precision for this parameter is achieved. All questionnaires and information gathered during the sampling by the survey team are handed over to the managing entity that maintains an electronic database
Monitoring frequency:	Annual
QA/QC procedures	All formulas applied to determine the statistical precision are standard formula. According to AMS II.G (version 04.0), paragraph 21, if the required precision is not achieved, the lower bound of the required confidence interval of the parameter value is to be chosen. No deductions have to be made if the precision is achieved by sampling a proper number of appliances. Data will be collected using the standard procedures and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. A traceable "identity check" of the ECS visited during sampling shall be performed and recorded (e.g. a picture of the appliance clearly showing its serial no., etc.).
Purpose of data	Calculation of baseline emissions
Additional comment:	This parameter will be monitored for all CPAs

Data / Parameter:	η_{new}
Data unit:	%
Description:	Efficiency of the project stoves deployed as part of the project activity (fraction), as determined using the Water Boiling Test (WBT) protocol.
Source of data:	Annual WBTs
Value(s) applied	
Measurement methods and procedures:	Water Boiling Test (WBT) protocol. Since three different stoves are to be distributed, a weighted average value has been applied.
Monitoring frequency:	Annually, as per AMS II.G version 04.0

QA/QC procedures:	Sampling and survey to be carried out with 90% confidence interval and a 10% margin of error. If results show that 90/10 precision is not achieved, the lower bound of 90% confidence interval of this parameter value will be applied.
Purpose of data	Calculation of baseline emissions
Additional comment:	-

I.7.2. Sampling plan

>>

The monitoring procedures and sampling plan described blow for the PoA have been developed with reference to the following:

- The approved methodology AMS-II.G, version 04.0; *Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass*
- The *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities,* Version 3 (EB 69 Annex 4)
- The *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities,* Version 02.0 (EB 69, Annex 5)

The following is the detailed description of the Sampling Plan for the PoA:

a. Sampling Design

i. Objectives and Reliability Requirements

The objective of the sampling system is to meet the monitoring requirements set forth in the methodology AMS-II.G (Vers 04.0). The parameters to be monitored are outlined in section I.7.1 of Part II. Each PAI may choose to monitor either annually or biennially, unless specified otherwise in the PoA-DD and CPA-DD.

Parameter values shall be estimated by sampling in accordance with the requirements in the applied methodology AMS-II.G (Version 04.0) separately and independently for each of the CPAs included in a PoA.

When annual inspection is chosen a 90% confidence interval and 10% margin of error shall be achieved for the sampled parameters. When biennial inspection is chosen a 95% confidence interval and a 10% margin of error requirement shall be achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision or 95/105 precision is not achieved, the lower bound of a 90% or 95% confidence interval of the parameter value may be chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/105 precision.

As per paragraph 22 (c) of AMS-II.G (Vers 04.0), no surveys are required to determine the leakages since a B_{old} has been multiplied by a net to gross adjustment factor of 0.95 to account for leakages.

As the PoA progresses and the number of CPAs increases, the sampling plan can apply to a group of CPAs as referred to in paragraph 20 of the *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities,* Vers 03.0 (EB 69, Annex 4). This will be applicable to CPAs that have installed similar types of efficient cook stoves which are sold within the same national boundary. In such an instance a 95/10 confidence/precision will be applied for the sample size calculation.

All monitoring shall be coordinated by the CME.

ii. Target population

The target population for the application of monitoring procedure will be the households, commercial stove users and institutional stove users (in particular) and communities in which efficient cook stoves have been sold (in general) as identified through the centralised record-keeping database managed by the CME.

iii. Sampling method

Stratified random sampling will be applied, since there are three non-homogeneous categories or strata (households, commercial stove users and institutional stove users). A simple random sample will be taken from each of these three categories separately. When identifying the categories or strata, no population element shall be excluded and every element must be assigned to only one stratum. For each strata, a random sample will be taken. The number of samples taken for each strata will be proportional to the size of the strata in relation to the whole population (See Section *"Sample Size"* below).

The stratification helps to ensure that estimates of the population characteristic are accurate, especially if there are differences amongst the strata.

iv. Sample size

The sample size will be determined as per The *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities,* Version 02.0 (EB 69, Annex 5) using the following formula for stratified random sampling:

$$n \geq t^2.N.(SD^2/p^2)/(((N-1)*0.1^2)+(t^2*(SD^2/p^2)))$$

Where:

n	Minimum size of the sample
N	Size of the population
t	Confidence interval (taken as 1.645 and 1.96 for 90% and 95% confidence intervals, respectively)
p	Population proportion, set at 0.86 (the proportion of stoves still in use after 3 years assuming an annual drop off rate of 5%)
l	Sets the acceptable margin of error, at 0.1 where annual monitoring is applied and 0.05 where biennial monitoring is applied
SD	Overall variance

To then decide on the number of stoves in the sample that come from each strata, proportional allocation will be applied where the proportions of units from the different strata/user types in the sample are the same as the proportions in the population.

To account for non-response, and based on previous experience *n* is multiplied by 0.8 (default response rate).

v. Sampling frame

The sample will be drawn from the stoves sales database, stratified by type of users i.e, households, commercial users and institutional users. Within each strata of users, the selection will be random from the CPA database. Once a number of samples are selected in each strata, the owner or the responsible person in the household, commercial user unit or institutional unit selected will be contacted.

b. Data to be collected

i. Field Measurements

Field measurement objectives and data to be collected are listed in section I.7.2 of Part II. The parameters to be monitored according to AMS-II.G (version 04.0) within each CPA are outlined below:

- Checking appliances to determine if they are still operating or are repaired or replaced by an equivalent in-service appliance.
- Checking the efficiency of appliances to ensure they are still operating at the specified efficiency or repaired or replaced by an equivalent in-service appliance.
- If a replacement of the appliance has been made, monitoring shall also ensure that the efficiency of the new appliances is similar to the appliances that have been replaced.
- Ensuring that the replaced low-efficiency appliances are disposed of and not used within the boundary or within the region.
- If baseline stoves continue to be used, monitoring shall ensure that the charcoal consumption of those stoves is excluded from B_{old}.

The above parameters are not subject to seasonal value fluctuations and the time period in which monitoring is conducted will not have an effect on the outcome of the monitored parameters. Results can therefore reasonably be scaled up to one year.

When a user purchases an ECS under a CPA in the PoA, the user will sign a Warranty Card for the stove. The PAIs shall be responsible for ensuring that all target beneficiaries' data will be included in the database and that all data is complete and accurate within respective documents. Hard copies of the Warranty Cards shall be kept by each CPA and all the data entered into a CPA database maintained by the PAI. The CME will maintain a consolidated database of all the data from the CPAs. This will be the central record-keeping database.

The record keeping database will be used to record the results of all monitoring, thereby avoiding double counting, with all data stored to be kept for at least two years after the crediting period or the last issuance of CERs for the project activity.

ii. Quality Assurance/Quality Control

The staff responsible for the data collection system will be trained on the management system to be put in place as part of the overall PoA. This will include:

- Data to be recorded in the database
- How to identify and record the serial number of the ECS
- How to fill out and where to submit copies of the Warranty Cards and any associated documents
- Procedure for dealing with a change in serial number or address of an efficient stove
- Monitoring procedures, in accordance with section I.7.2. of the PoA-DD Part I and section I.7.3 of the PoA-DD Part II.

On completion of training, trained staff will receive certificates. The name, company and contact details of all attendees will be recorded as part of the CME's PoA database. This will be used to confirm that the training has been completed and that staff are qualified to carry out the data collection as required under the PoA.

In order to minimise errors, a quality control and assurance system will be established. This strategy will include a planning phase in which a clear definition of the target population, the issues and variables to be investigated, the sampling frame and sample size are determined, a distribution and random sample selection in the different strata of the population is defined, and the design of a questionnaire that reflects the objectives of the survey and facilitates field operations and information processing is prepared.

In order to minimise errors, all personnel conducting field measurements, both for the collection of baseline data and annual monitoring of CPAs, on behalf of the programme, will receive training on

the procedures to be used for data collection, including the format in which data should be collected, project background, basic functioning of the efficient stoves and any other relevant project background.

Response rates will be maximised by contacting all randomly-selected stove users beforehand to arrange a practical site visit date and sampling over the minimum required number to compensate for any non-responses. In cases where participants refuse to participate in the monitoring, the reason shall be documented in the CME's programme database. The CME will explain that monitoring is part of the requirements of the programme and try to arrange an alternative date for a site visit, or carry out monitoring with another member of the household, commercial user or institution. The programme database will have a provision for recording any monitoring carried out in reference to the serial number of the ECS sold.

All monitored data will be entered into the CME database. In case an error is made in data entry, original copies of all monitoring documents will be kept and filed per CPA in chronological order per serial number. The name, date and contact details of the surveyor will be detailed on all completed monitoring surveys, to allow for the follow-up of all incomplete/unclear data.

iii. Analysis

Data will be used for the preparation of annual/biennial monitoring reports for each CPA or a group of similar CPAs. The results of all monitoring will be entered into both the individual CPA's and the CME's database. Where it is found that a replacement stove has a lower efficiency, or that an efficient stove is no longer in use, the stoves will be removed from inclusions in the CPA.

c. Implementation plan

All sampling efforts will be conducted by third parties who have undergone training as part of the programme, as described above. Any samplers will be required to speak the local language, or will be accompanied by interpreters, allowing for full understanding of any responses given by users, and any questions therein.

Monitoring shall be conducted annually or biennially, depending on the approach chosen in the CPA.

Sampling will be undertaken as part of a Sampling Plan that is in line with the requirements of:

i. "Standard for sampling and surveys for CDM project activities and Programme of Activities", Version 03.0,

ii. the methodology AMS-II.G, Version 04.0

iii. "Standard for sampling and surveys for CDM project activities and programme of activities, vers 0.3.0, EB69, Annex 4.

Wherever reasonably possible, the PoA Sampling Plan will ensure that sample sizes are large enough to meet 95/5 precision in the case of biannual sampling, and 90/10 precision in the case of annual sampling. In cases where such precision is not achieved, the lower bound of a 90%/95% confidence interval of the parameter value will be used as allowed by the methodology. Depending on the CPAs that are included in the PoA, simple random sampling may be appropriate; in other cases stratified random sampling may be more appropriate. Where stratified random sampling is applied, the weighted average will be calculated and used for emission reduction estimation. The CME will provide guidance to the CPA implementer and/or any other parties that will be involved in carrying out sampling activities as part of the monitoring plan.

It is planned that individual verifications shall be done for each CPA. Although some CPAs will be owned multiply by the same PAI, most CPAs shall be owned by different companies (PAIs) and

shall be verified separately. Thus PoA level sampling has not been considered as it is not applicable.

For emission reduction calculations, B_{old} is determined using option 7 (a) of the methodology AMS-II.G, version 04.0 and is calculated as the product of the number of appliances in use in year y (N_y) multiplied by the by the average annual consumption of woody biomass per appliance, $B_{old,\ appliance}$ (tonnes/year).

$$B_{old} = N_y * B_{old,\ appliance}$$

To determine the average annual consumption of woody biomass per appliance ($B_{old,\ appliance}$), a survey of local charcoal usage is carried out from where the average annual consumption of charcoal per baseline appliance ($B_{old,\ appliance,\ survey}$) is determined. This parameter has been introduced to facilitate the conversion from charcoal to woody biomass per appliance and the correction for leakages.

To account for both NRB-related and PoA-related leakages, and as provided for in AMS-II.G, $B_{old,\ appliance}$ is multiplied by a net to gross adjustment factor of 0.95 (L_{NRB}) for NRB-related leakages, and by another net to gross adjustment factor of 0.95 (L_{POA}) to account for PoA-related leakages. Monitoring of both types of leakages will therefore not be required.

To convert from the average annual consumption of charcoal per baseline appliance ($B_{old,\ appliance,\ survey}$) to the average annual consumption of woody biomass per baseline appliance, $B_{old,\ appliance,\ survey}$ is multiplied by 6. This conversion factor is based on the last paragraph of page 1.45 of the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*[46], which states as follows:

"If no local information is available, 6 kg of wood input per kg of charcoal may be used as default (FAO, 1990)".

From the above, the average annual consumption of woody biomass per baseline appliance is calculated using the following equation:

$$B_{old,\ appliance} = B_{old,\ appliance,\ survey} * 0.95 * 0.95 * 6$$

To determine N_y for ex-ante calculations, an average stove life of 4 years (since the stoves are 100% steel) and a drop-out rate (DO_y) of 5% (based on previous experience in Ghana in another stove project and the need to be conservative) are assumed. For ex-post calculations, drop-off rate will be statistically determined. To compensate for the actual operating days for a given stove, N_y is further adjusted for the proportion of the year during which the stoves are in use using the factor, $mp_{length}/365$ (where mp_{length} is the number of days the a stove is in use during the year). For ex-ante calculations, it is assumed that mp_{length} is 365 days. The number of stoves in use, ($N_{y,no\text{-}adjusted}$) is then adjusted for the drop-out rate and the stove operating days using the equation:

$$N_y = N_{y,non\text{-}adjusted} * (1 - DO_y) * mp_{length}/365$$

B_{old} shall be determined once at the beginning of the CPA.

$B_{y,\ saving}$ is estimated from adjusted B_{old} using Option 2 of AMS-II.G (vers. 04.0) as follows:

$$B_{y,\ savings} = (B_{old} * (1 - \eta_{old}/\eta_{new}) \qquad \textbf{(3)}$$

Therefore, the emission reductions achieved by a typical CPA will then be calculated ex-ante as per AMS IIG, Version 04 as follows:

---

[46] See http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ref3.pdf

$$ER_y = B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel} \quad (1)$$

Using published country-specific data, it will be established that non-renewable biomass has been used since 31 December 1989, within the geographic boundary of Ghana (or any other future Sub-Saharan Country added to the PoA) where the CPA is implemented. This will be done for each CPA.

The fraction of non-renewable biomass (f_{NRB}) will be either determined from the default values endorsed by designated national authorities and approved by the Board that are available at http://cdm.unfccc.int/DNA/fNRB/index.html or will be calculated in accordance with the "*Information note; Default values of fraction of non-renewable biomass for least developed countries and small island developing states*, version 01.0 (EB 67, Annex 22) using the equations below. Where f_{NRB} is calculated, wit will be cross checked against those values provided in the "*Information note; Default values of fraction of non-renewable biomass for least developed countries and small island developing states*, version 01.0 (EB 67, Annex 22).

A national-level default fraction of non-renewable biomass (f_{NRB}), in %, is applied and will be calculated from the equation below:

$$fNRB = \frac{NRB}{NRB + DRB} \quad (1)$$

The Total Annual Biomass Removals (R) from the specific country will be calculated as a proxy for the quantity of woody biomass used in the absence of the project activity (B_y) and estimating the proportion of R that is demonstrably renewable (DRB) and non-renewable (NRB) using equations below:

$$NRB = R - DRB \quad (2)$$

The Total Annual Biomass Removals (R) for each country is inferred by calculating the sum of the Mean Annual Increment in biomass growth (MAI) and the Annual Change in Living Forest Biomass stocks (ΔF). Given biomass growth (MAI) and change in stock (ΔF) are both known, the balancing removals (R) is calculated as the sum of the two as follows:

$$R = MAI + \Delta F \quad (3)$$

The Mean Annual Increment of biomass growth (MAI) is calculated in equation 4 below as the product of the Extent of Forest (F) in hectares and the Ghana Growth Rate (GR) of the Mean Annual Increment as follows:

$$MAI = F \times GR \quad (4)$$

The demonstrably renewable biomass (DRB) is calculated in equation 5 below as the product of Protected Area Extent of Forest (PA) in hectares and the country-specific Growth Rate (GR) of the Mean Annual Increment:

$$DRB = PA \times GR \quad (5)$$

Monitoring and verification shall be by sampling, following the guidance provided in the "Standard for sampling and surveys for CDM project activities and Programme of Activities", Version 03.0 (EB 69, Annex 4) and in accordance with the methodology AMS-II.G, Version 04.0.

On annual basis, the following will be determined through sampling and testing in accordance with the "Standard for sampling and surveys for CDM project activities and Programme of Activities", Version 03.0 and the methodology AMS-II.G, Version 04:

- The efficiency of the project stoves (η_{new})
- The rate of drop off of the stoves in year *y*, DO_y.
- Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass ($f_{NRB,y}$)

In case the required precision is not achieved, the lower bound of the confidence interval of the parameter value will be chosen.

I.7.3. Other elements of monitoring plan

>>

The parameters shown in Part II, Section I.7.1 are monitored. Monitoring and verification shall be by sampling, following the guidance provided in the "Standard for sampling and surveys for CDM project activities and Programme of Activities", Version 03.0 and in accordance with the methodology AMS II.G, version 04.0.

Sales Database

N_y is monitored though the Sales Database for all the ECSs deployed, which are maintained electronically by each PAI and periodically checked by the CME to ensure there is no double counting. In order to ensure completeness and accuracy of monitoring information, electronic database(s) will be operated and maintained by PIAs. This information will further be maintained by the CME who may verify the reported sales with the number of stoves produced by the manufacturer. Since the unique code inscribed on the cook stoves will correspond to its CPA, the occurrence of double counting can be avoided

Monitoring Efficiency

In compliance with paragraphs 15, 16 and 21 of AMS II.G, Version 04.0, and on biennial basis, the efficiency of representative sample of all ECS will be determined by sampling and testing the sampled CPA stoves for efficiency to ensure that the ECSs are still operating at the specified efficiency (η_{new}) or that they are replaced by an equivalent service stove. Only new stoves with efficiency commensurate or better than the continuing efficiency will be included for carbon calculations.

Efficiency monitoring for the CPAs will be the responsibility of the PAIs with close supervision of the CME.

Biomass savings

On an annual basis, the proxy efficiency (η_{new}) of the project stoves will be determined for the various types and/or sizes of project stoves under distribution. The weighted average efficiency of the stoves will be applied as the average proxy efficiency. The efficiencies of the stoves will be determined using the Water Boiling Test protocol that is internationally accepted. From the KPTs, and applying the guidance given in the "*Standard for sampling and surveys for CDM project activities and Programme of Activities",* Version 03.0, and in accordance with the methodology AMS II.G, version 04.0, the biomass saving ($B_{y,\ savings}$) will then be calculated from ($B_{old,\ appliance,\ survey}$) and the number of ECS still in use (N_y). The KPTs will be the responsibility of the CME.

During the KPTs, it will be verified that the any baseline stoves do not continue to be used. If any baseline stoves are found to be in use, the fuel-wood consumption of those stoves shall be excluded from *Bold.*

In order determine $B_{y,\ savings}$, the value of B_{old} will not be monitored, but will be determined using Paragraph 7(a) of AMS IIG, 04.0, local survey, and prior to validation for each CPA.
The continuing use of baseline stoves will be monitored by conducting the sampling for efficiency of project stoves, which shall include observation as to continuing use of baseline stoves.

Monitoring Ongoing Usage

The percentage of stoves sold by the PAI which are no longer in use, the Drop-Out Rate, (DO_y) will be found by sampling on a biennial basis. The number of stoves in use will be adjusted by the Drop-Out Rate in order to determine the number of project stoves in use, (N_y) and to calculate the emission reductions. The drop off monitoring will be the responsibility of the CME.

Monitoring leakage:

Provisions have been made for both the leakage due to the use of non-renewable woody biomass saved under the project activity (L_{NRB}) and due to the PoA for the use of non-renewable woody biomass outside the project boundary to create non-renewable woody biomass baselines (L_{POA}).

As provided for in AMS-II.G, vers 04.0; B_{old} can be multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required. The net to gross adjustment factor of 0.95 to account for leakages will be used by the PoA for accounting leakages.

In order to control costs, sampling may be across CPAs deploying the same ECS type since this will not affect the precision/ confidence requirements of the methodology, as long as the inspection frequency is met. The values of the sampled parameter identified above will be found according to 90/10 precision for annual sampling, 90/10 for annual sampling, or lower bound.

SECTION J. Crediting period type and duration

>>
Renewable Crediting period

7 years and 0 Months

SECTION K. Eligibility criteria for inclusion of CPAs

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	
	Description	**Conditions to be met**	**Justification** *(To be done at CPA-level)*	**Conclusion** *Yes/No*
1	The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA	The CPA will be located within the geographical boundary set in the PoA in Section A.2, namely, Ghana and Kenya (with the possibility of expansion to other Sub-Saharan Africa countries).		
2	Non-renewable biomass use	It can be shown that non-renewable biomass has been used since 31 December 1989, within the geographic boundary (Ghana and Kenya with the possibility of expansion into other Sub-		

		Saharan African Countries) where CPA is implemented		
3	Conditions that avoid double counting of ECSs and CPAs	i. ECSs A unique serial numbering or identification system for the stoves disseminated is applied. The serial number will be traceable to the following: • Programme identification • The CPA and its location • Acronym of project participants ii. CPAs The CPA is exclusively bound to the PoA. Confirmation that the programme activity has not been and will not be registered either as a single CDM project activity or as a CPA under another PoA. The serial numbers are listed in the CME Database. The CPA shall not be proposed as an individual CDM project and/or as a part of any other CDM PoA and/or any other mechanism to avail climate change mitigation benefits.		
4	The specifications of technology/measure and performance level	Improved cookstove has a minimum efficiency of 20%. Stoves shall be tested annually for continued performance. The efficiency of the project systems to be certified by a national standards body or an appropriate certifying agent recognized by it. Alternatively, manufacturer specifications on efficiency based on water boiling test (WBT) may be used		
5	Conditions to check the start date	The CPA start date shall be after the PoA validation start following a successful pilot phase.		
6	The conditions that ensure that CPAs meet the additionality requirements	Each CPA will demonstrate the additionality by establishing that in the absence of CDM PoA, the CPA would not occur, a positive list of technology and project activity types that are		

		defined as automatically additional or barrier analysis. Barrier analysis will be done in accordance with the latest versions of the "Guidelines on the demonstration of additionality of small-scale project activities, ver 10.0, EB 83 annex 14" and the "Standard for the demonstration of additionality, development of eligibility criteria and application of multiple methodologies for Programme of Activities". The country in which the CPA is to be implemented has no laws, policies or mandatory requirements stipulating the adoption of efficient charcoal cook-stoves and the CPA is a voluntary action by the PAI.		
7	SSC limit for CPAs	The annual energy savings of each CPA shall not exceed the limits of 180 GWh_{th}/year over the entire crediting period. Ref Clarification about the threshold of thermal energy savings in AMS-II.G (submitted 21 Sep 08); http://cdm.unfccc.int/filestorage/A/M/_/AM_CLAR_VIIC5MTUUWR9PRPJL0EXOT3G2CKSFQ/Response%20SSC%20WG%20provided.pdf?t=a3F8bWFhaWJwfDDgR6TVWAKpcLVnwbAqV3mr At the time of joining the PoA, the maximum number of stoves required to reach the SSC threshold shall be determined and documented in the CPA-DD. Once the maximum number of appliances under the threshold is reached (or before, as deemed appropriate), the CPA shall be closed and, depending on the circumstances, a new CPA may be started to accommodate any new stoves sold		
8	Exception from de-bundling rules	Each ECS shall reduce energy consumption by less than		

		1.8GWh$_{th}$/year. At the time of joining the PoA, the energy saving per stove shall be determined and verified by the CME as not greater than 1.8 GWhth/year (1% of 180 GWhth/year). Only CPAs meeting this criterion will be listed in the PoA and the actual unit ECS energy saving will be documented in the CPA-DD		
9	Carbon rights ownership	The CPA Implementer shall cede the rights for issuance of the CERs to the CME		
10	The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis	Each CPA shall conduct a local stakeholder consultation process for informing the various relevant stakeholders and obtaining feedback and comments on the CPA as specified in section F of the PoA-DD. Further details are presented in section B of the CPA-DD. The consultations shall meet both CDM and Gold Standard requirements. Environmental Impact Analysis (EIA) is not required to be conducted for CPAs under the PoA. Evidence will be provided that the CPA is exempt from undertaking the Environmental impact analysis (EIA) at CPA level. Where such evidence is not available, an EIA will be conducted at the CPA level		
11	Documentation	The CPA is described appropriately in a CPA-DD document which is approved by the CME and validated by the DOE assigned by the CME		
12	Non-diversion of ODA/Non-use of Public Funding	The CPA confirms that funding from Annex I parties, if any, does not result in a diversion of official development assistance.		
13	Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid connected/ off-grid) and distribution mechanisms (e.g. direct	The target group will be households, commercial user and institutions using inefficient charcoal stoves for cooking using non-renewable biomass in urban areas. The beneficiaries will be identified		

	installation	based on the any identification cards given to the households by the government, where available, and otherwise the name of the stove purchaser will be stated. Also, the name of the area/locality or town will be recorded.		
14	Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys	Each CPA will conduct sampling & surveying as appropriate or applicable based on requirements of: i. Sampling and survey methods described in the approved methodology AMS II.G, version 04.0, Energy efficiency measures in thermal applications of non-renewable biomass. ii. "Standard for sampling and surveys for CDM project activities and programme of activities", version 03.0, Annex 4, EB 69		

The demonstration of compliance with the eligibility criteria will be done at the CPA level.

Appendix 1. Contact information of coordinating/managing entity and project participants

Coordinating/managing entity and/or project participants	☒ Coordinating/managing entity ☒ Project participant
Organization name	ClimateCare Limited
Country	Channel Islands
Address	Esplanade, JE1 1BD
Telephone	+44 (0) 1534 888 777
Fax	N/A
E-mail	mail@climatecare.org
Website	www.climatecare.org
Contact person	Tom Morton

Coordinating/managing entity and/or project participants	☐ Coordinating/managing entity ☒ Project participant
Organization name	Swedish Energy Agency
Country	Sweden
Address	Kungsgatan 43, P.O. Box 310 SE-631, 04 Eskilstuna
Telephone	+46 (0) 16 544 20 94
Fax	N/A
E-mail	kenneth.mollersten@energimyndigheten.se
Website	
Contact person	Kenneth Mollersten

Appendix 2. Affirmation regarding public funding

Not applicable (See Part I, Section A.6 above)

Appendix 3. Applicability of methodologies and standardized baselines

Please refer to section I.2 of this document for details on the methodology

Appendix 4. Further background information on ex ante calculation of emission reductions

Please refer to sections I.6.3 of this document for details.

Appendix 5. Further background information on monitoring plan

Please refer to Section I.7 of this document for details.

Appendix 6. Summary report of comments received from local stakeholders

Appendix 7. Summary of post-registration changes

The following is a summary of the changes being proposed in this PRC:

i.) Changes have been made on the following monitored parameter, where the frequency of monitoring has been changed from "once at the time of inclusion to the PoA" to "Annual"
   a). Annual energy savings per appliance
   b). Annual number of appliance to reach small scale threshold

ii.) Monitoring frequency of the monitored parameter B_{old} has been changed from "calculation of the baseline emission reductions" to "Annual".

iii.) Monitoring frequency of the monitored parameter DO_y has been changed from "Biennially for each CPA in the PoA" to "Annual"

iv.) Editorial corrections due to typographical errors or adoption of the latest PoA-DD template

The following is the history of all post-registration changes to the PoA that have been approved by the Board after its registration:

i.) Change of PoA boundary to cover Kenya

ii.) Use of positive list of technology and project activity types that are defined as automatically additional (deemed additionality) has been added as an option for additionality in the CPA inclusion criteria. This aligns with the requirements of the Methodological tool: Demonstration of additionality of small-scale project activities, ver 10.0, EB 83 annex 14.

iii.) The specifications of technology/measure and performance level has also been changed to allow for broader efficiency testing of the stoves which will be included into the CPA. The efficiency testing has been broadened to allow PAI to test the stoves using appropriate method available to them in line with the approved methodology and with best practice on stove testing. This change does not affect the monitoring plan outlined nor will it affect the emission reductions achieved by the CPA.

iv.) The source of data used to determine $B_{old,\ appliance,\ survey}$ has been changed to be both survey method and use of historical data. This change aligns with paragraph 7 (a) of the methodology. The change does not impact the design of the PDD nor affect the monitoring plan.

v.) The parameter, $B_{old,\ appliance,\ survey}$, has been moved from section I.7.1 to section I.6.2 in response to a verification Forward Action Request (FAR) raised by the DOE during the last verification. This has been done due to the fact that the parameter is fixed at validation for a given CPA and it is not monitored for the entire crediting period.

vi.) The requirement for a GS passport has been removed from the eligibility criteria of the PoA-DD. The requirement was removed because it is no longer relevant since the PoA is not going for Gold Standard certification as a result of the market requirements.

- - - - -

Document information

Version	*Date*	*Description*
08.1	28 June 2017	Revision to: • Remove a duplicated instruction; • Make editorial improvement.
08.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for programmes of activities" and with the PDD and CPA-DD forms; • Make editorial improvement.
07.0	25 May 2017	Revision to: • Ensure consistency with the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the "Programme design document form for small-scale CDM programmes of activities" (CDM-SSC-PoA-DD-FORM); • Make editorial improvement.
06.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: • Include provisions related to choice of start date of PoA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Add exception for generic CPA where technology is under positive lists; • Make editorial improvement.
04.1	5 August 2014	Editorial revision to correct the document information table.
04.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1; • Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Appendix 6; • Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM; • Make editorial improvement.
03.0	3 December 2012	EB 70 Revision to reflect changes to the *Guideline: Completing the programme design document form for CDM programmes of activities* (EB 70, Annex 6).

Version	*Date*	*Description*
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
01.0	27 July 2007	EB 33, Annex 41 Initial publication.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: programme of activities, project design document